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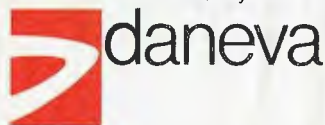
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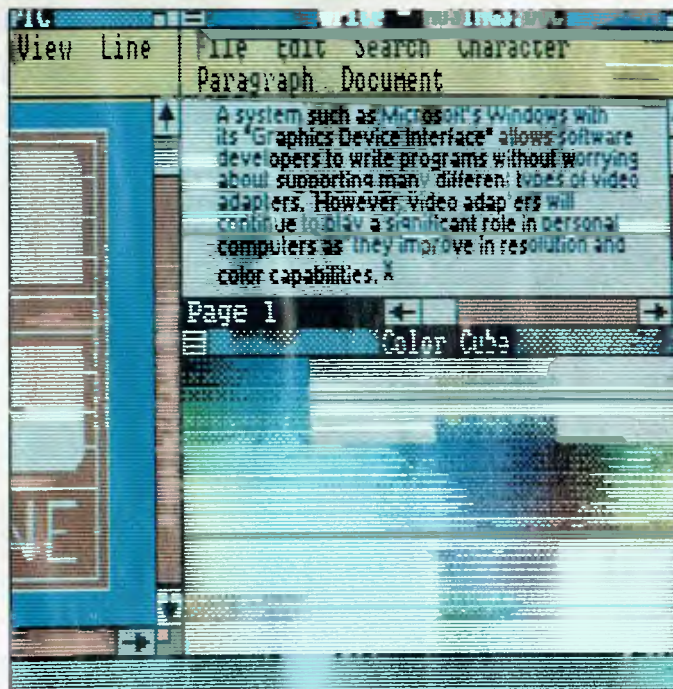
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FEATURES

Brighten your screen with living color

IBM's Enhanced Graphics Adapter has inspired a number of compatible boards, effectively establishing it as the new standard in PC color graphics. In this review, Charles Petzold and Ian Robinson present an extensive analysis of the EGA and its clones.

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From the editor's screen

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Australia's leading IBM PC and compatibles guide is expanding and Ian Robinson introduces some of the recent additions to the team.

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Is small business ready for PC networks or more to the point, are networks quite ready for small business? Stephen Manes airs his opinions.

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This month's collection of letters includes the first nomination for the PC Australia Awards for Technical Excellence.

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Clive Lassiter explores Televideo's latest offering — a powerful AT compatible known as the TeleCAT.

PC News

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A new-look Top Ten and extended coverage are features of this month's PC News pages.

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Margaret Macrae reports on the latest and greatest bits and pieces available for the IBM PC and compatibles.

Spreadsheet clinic

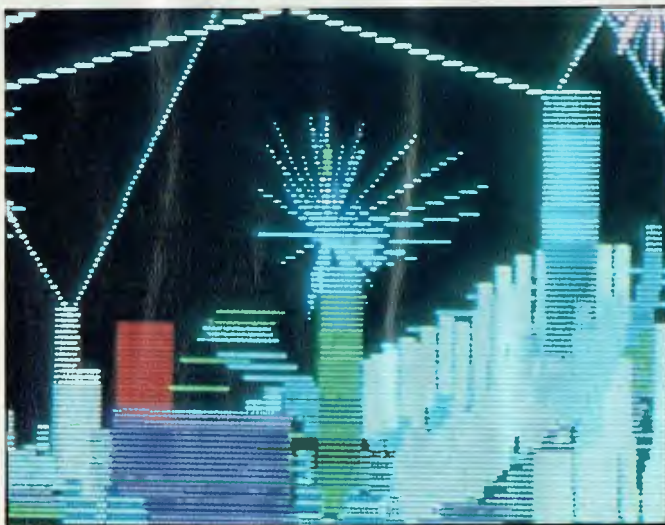
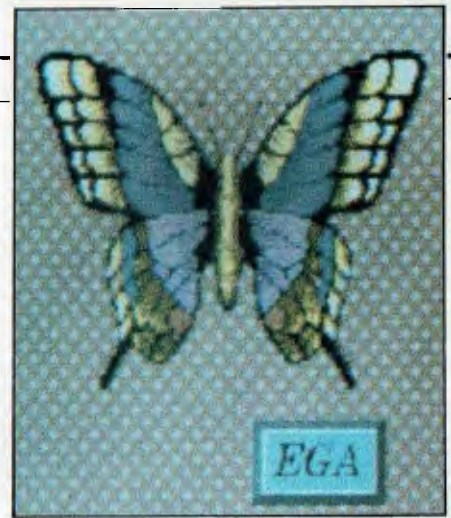
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Hints, tips and patches from spreadsheet fans, adjudicated by resident expert John Green.

User-to-user

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If you have a great idea, patch, subroutine or technique, why not send it in to Stephen Murray and try for a free box of disks?



A new dimension in graphics

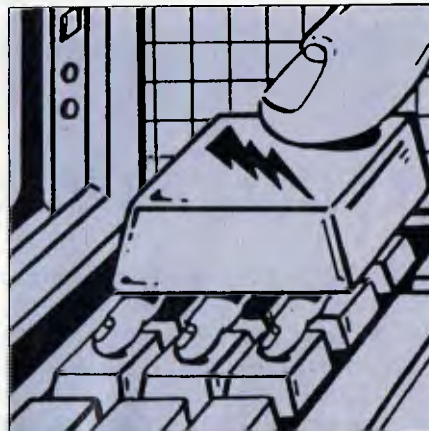
Did you know that you can display four-dimensional graphic images on your two-dimensional PC screen? Graphics devotee Phil Grouse shows how, with a Turbo Pascal program listing.

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Enhancing your keyboard

Keyboard macro programs can save potential hours of repetitive keystrokes. Murray Frazer explains how to make your PC operate more efficiently by using them.

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Tech notebook #21 81
Another single-page solution for more technically-inclined readers.

BBS file 83
The Sydney-based Frontier bulletin board is the subject of Robin Howells' scrutiny in the latest of his series of ongoing BBS reports.

The PC bulletin board 84
Staff writer Margaret Macrae is also responsible for the Australian PC community's official notice board. If you have any information to add, phone her on (02) 235 6617.

The videotex page 87
For those who may have thought the PC industry was in the doldrums, Vi Adelle describes a particular sector which has experienced 300 per cent growth in one month.

Inside track 89
John Dvorak describes his first impressions of a new 3-D spreadsheet — being developed at Boeing's US headquarters — which he discovers has similarities with the good old jumbo jet.

Coming Up 89
The next issue of PC Australia marks our first anniversary, so make sure you do not miss out on your copy.

The Stein way 90
Once a PC is upgraded, turbocharged or otherwise accelerated, it can be a painful experience reverting to normal speeds, as Les Stein explains.

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Those of you who make it a habit to scan our publisher's panel on page four will have noticed a number of changes in the PC Australia line-up in the past few months, reflecting the evolving nature of our magazine and of the BRW group in general.

To begin with, as of the August issue Margaret Macrae joined the editorial team. She will be covering all the PC news from Sydney, as well as maintaining the popular Top Ten listing, the PC Bulletin Board pages, and the New Products' pages.

Macrae is listed as PC Australia's staff writer but is also our Sydney representative, covering what is rapidly becoming Australia's second most important city (in PC terms) behind Melbourne. I expect that remark will generate its fair share of responses from readers but, as I have said many times before, we pride ourselves on being "the interactive journal".

Putting local patriotism aside for a few moments, I am very pleased with the increasing number of messages I have been receiving through Viatel's electronic mail service from PC Australia readers across the country. I

will make a point from now on of including the best of these in our Letters to PC pages each month. We have also implemented electronic order forms, so that you can now dial up the PC Australia BBS and order binders, PC Listing Disks or paid subscriptions, simply by keying in your credit card number.

Other changes in the PC Australia line-up include a new publisher, John McGaulley, who has been with PC Australia from the outset. Barry Telfer (the previous incumbent), has moved from the frenetic pace of PC magazine publishing to the more sedate atmosphere of Time Australia — the BRW group's latest weekly news magazine.

This issue we gain a new art director, Mark Houston, a bird's-eye view of whom featured on the cover of the August issue.

In our last issue John Dvorak, a respected US-based industry commentator appeared for the first time. Dvorak, whose "Inside Track" column has long been one of the more entertaining snippets of computer journalism has proved to be consistently popular overseas. Between John Dvorak, Les Stein and Vi Adelle, we guarantee to keep the local PC industry on its toes.

I mentioned some time ago that we had reached our target of 15,000 specially-selected readers on the complimentary subscription list. We have been "cleaning up" this list to allow more people to get hold of PC Australia and picked out several hundred instances of duplications, where several copies were being sent to the same address or where the same person was receiving more than one copy. These have been deleted to make room for those on the waiting list. Nevertheless, there are still many more application cards waiting for

their turn, so if you happen to have sent in one of these and are reading a friend's copy, the cold hard truth is that you must be prepared to wait a few more months or else fork out \$48 for a standard paid subscription.

During my regular attendances at user group meetings in Melbourne and Sydney, the feedback received about the magazine has been overwhelmingly positive and I appreciate the many constructive comments and tips. If you attend either of these meetings, please take the opportunity to introduce yourself and make any suggestions about improving PC Australia — after all, it is your magazine. ■

What's inside

September 23-24 marks the high point of the Sydney PC User Group's calendar — APCON 86. The PC News pages preview the APCON convention but no written description can effectively do justice to the atmosphere of this event. I commend APCON 86, which will this year feature PC Australia's senior writer Les Stein and myself as guest speakers. Further details are included on an insert within this issue.

As you can see from our cover, graphics are the theme of this issue and besides our in-depth view of IBM's Enhanced Graphics Adapter (EGA) and some of its clones, we feature a fascinating hands-on article by graphics aficionado Phil Grouse (a long-time fan of Clive Lassiter) on how to generate 4-D images on your 2-D PC screen. You should know by now that within PC Australia anything is possible!

Ian Robinson can also be heard on 3AW's Computer Cafe program each Thursday night from 8.30 to 9.00 pm.

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The pain of shared resources

To hear some people tell it, sharing computer resources is absolutely the only way for a small business to go, especially if it hopes ever to become a big business. To hear those who have been snookered by such claims however, sharing resources is more often than not a high-speed road to frustration, pain, and ruin. Even the nomenclature is confusing. Quick: is IBM's PC Network the Token Ring Network by another name?

You need a guide in order to avoid such stumbling blocks before you take the long and winding ride down the shared-resource road. Unfortunately, the guide is called a "consultant," and the meter keeps running and running even if you never quite get to your destination. Consultants love shared-resource systems because that is what they cut their teeth on in the mainframe and minicomputer worlds and the consultant is quite often the only one with a thumb in the leaky dyke along the highway. In the Holland of yore, the kid performed his services free; local consultants' digits tend to be somewhat pricier.

So it is no wonder so many small operations keep stalling when it comes to hooking their PCs together. After all, in corporations and bigish small businesses, data-processing experts are on-staff or on-call to get systems running and take care of the inevitable problems. In the rest of the world, the microcomputer user generally sets up and maintains the system without benefit of an on-site professional. That makes non-corporate users rather fussy; it also demands that they understand a fair amount about what is going on. Moreover, non-corporate PC users detest paying for support; their budget for this item is often limited to the cost of phone calls to dealers and friends.

Increasingly, the way a small business gets computerised is that the boss gets hold of his nephew's PC,

discovers what a help it is and decides to go further. But by then he has become used to microcomputer programs that display at least a modicum of elegance right off the shelf. The last thing he wants is the clunky pick-a-number menu, lame data-entry-form structure, and second-rate text-editing software typical of the ported mainframe and minicomputer software that is most commonly offered for vertical markets and many shared-resource environments.

Worse, he is not exactly overjoyed when he discovers he may have to share the processing speed of his machine with half a dozen other folk. "Adequate response time" in the mainframe world is "too damned long" in the land of the single-user AT. The choices often boil down to working with desirable software slowed to a crawl or using mainframe-type stuff that is painfully out of date.

There are plenty of other rocks in the road to shared resources. Who is going to plan the physical cabling? Who is actually going to be the one to run the cables through the walls? Who is going to mind the printer when the guy across the hall from it decides to run a big job? Setting up a network is a whole lot more complicated than running down to the local Computer-Land, pointing to a couple of boxes of hardware and software, and running the Visa card through the machines.

Anyone who remembers the original PC learning experience is bound to view the new complex situation with a certain cynicism. Now there are system, file and record integrity to worry about. Backup is a problem even with standalones; what are you in for when you have got to back up everybody's work, all at once? Losing your spreadsheet or projections for next year is not tragic; losing your company's entire financial and customer database is a subject fit for a Sophocles.

Where do you turn when things go wrong? The original consultant is probably the one who got you into this mess in the first place, and your friends cannot help. A second opinion may cost thousands and things will go wrong. When the system goes down for a day, the whole company will get paid for standing around in Bob Hope emulation mode.

The worst part is that the level of integration the small-business user really wants probably is not available and may not be for a good long while. The dream is a program that dynamically updates everything from financial projections to mailing lists to monthly books with each new piece of data entered. The reality is a series of less-than-elegant data-massage sessions that can be performed faster on single-user machines than on the hobbled octopi of shared resources.

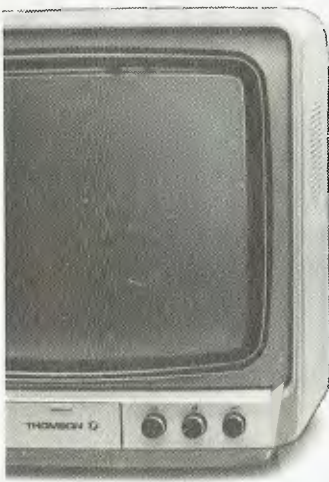
Shared systems may be the wave of the future, but for small businesses that future is more distant than a lot of people think. It is likely to take 80386-based machines, an operating system that can fully access their capabilities and still run PC-DOS applications and highly complex new software. Until the guy whose head is on the line (and in small operations, that head is very hard to hide) feels confident about being able to buy the thing, set it up, and keep it running all by himself, the shared system is something many small operations will rightly continue to do without.

I will bet the complexity of shared systems is as much as anything else responsible for the success of Bernoulli Boxes. These may not be elegant ways to share resources, but they are safe, easy to implement, and relatively cheap and you do not need a consultant to understand them or keep them running. ■

Stephen Manes is a regular contributor to PC magazine in America.

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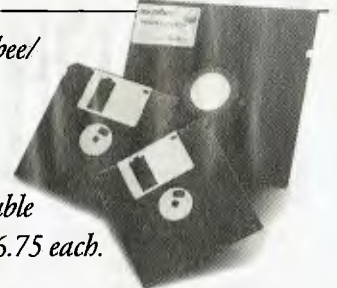


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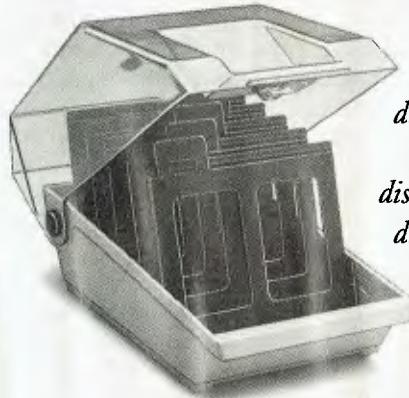
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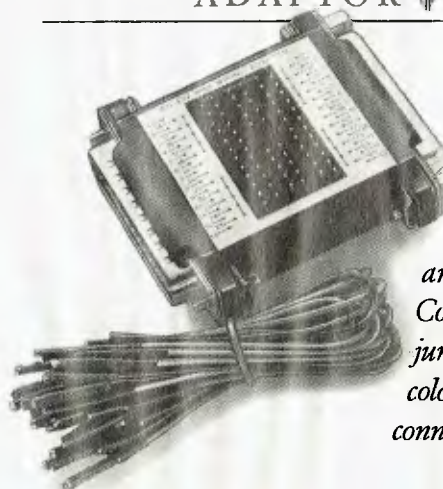
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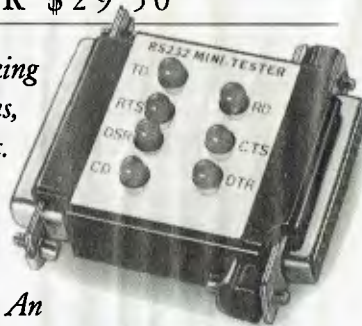
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Nogging and scantling

The first written nomination for the PC Awards for Technical Excellence has arrived. There are also Viatel letters and Microsoft tackles a technical question.

The first nomination

I have just finished reading with great interest your July editorial regarding the inaugural PC Australia Awards for Technical Excellence and would like to submit my nomination.

We are a kit home manufacturer and as our homes are prefabricated in our factory before being shipped to customers, we use a timber house framing design package developed locally by Pro Builders Software. This package was released onto the market in May 1986 and even in the short time we have been using it, has proven to be time-saving, cost-effective and accurate.

The program uses a VP-Planner spreadsheet template as the basis for performing the intense amount of calculations required and its method of operation is quite straightforward. First the operator fills in relative information from the plan of the house to be constructed, such as wall plate lengths, window and door sizes, wall datum height and roof pitch. (Split level houses can also be designed by changing the datum height.) The program has a default file for commonly-used parameters such as stud and nogging spacing, opening stud sizes, lintel sizes, and timber types and prices.

Once this information has been entered, the program produces detailed information for the manufacturer of the house frame, including a material purchasing list for all scantling (in standard timber lengths), nails, braces, a costing sheet detailing material, labor and delivery costs, a material cutting list for every piece of timber in the frame (and in the case of a raking wall the cut angle), a markout list positioning

every stud relative to top and bottom wallplates and a formal quotation with options on validity periods.

We have been operating this program for several months and purchased it after much research into the availability of similar packages sourced either locally or overseas. The reason that this particular package stands out from the relatively few available is its total accuracy and logical operation. No other package contained the detailed information required to cut every piece of timber in a house frame and assemble it 'jig-free' with no wastage. In using this package our estimating time has been reduced by about 12.5 per cent!

We run the program on Chendai compatibles, one with 384K RAM and twin floppies and another with 640K and a 10M hard disk (which improves file access times). No user interaction is required in terms of changing from one PC to the other as the initial access file containing password access also has a self-configuration function which sets up temporary and permanent filing on the correct disk drives. It also establishes file size limits relative to installed RAM.

The author, Tim Donaldson can be contacted on (059) 83 9788 during business hours.

Philip Stafford
Bittern, Vic.

If you have difficulty distinguishing between nogging and scantling, then this may not be the software for you, but nevertheless it sounds like a fascinating yet useful locally-made package. The PC Australia Awards for Technical Excellence have generated a great deal of positive response from the local PC community, although Philip's submission is the first completed nomination to appear. Just to refresh your memories, the awards are based on readers' written submissions and apply to any Australian-made PC

products (hardware, software, furniture or services) released during 1986. The winners will be announced early next year.

Excellent but confusing

The article in the June 1986 issue on windowing was excellent. I could never understand how windowing programs worked with anything other than simple "DOS command only" programs. The article indicated that the answer is simple: they usually do not. The article said that with a mysterious thing called a PIF file, such ill-behaved programs could (under DESQview) operate successfully in windows.

I am still confused however. Can someone please explain how, when I move a character to memory location A000:0000 (the first byte of my memory mapped screen), some other program will know what I have done and put it into the right window on the screen.

Geoff Russell
St Morris, SA.

Mike Olsson of Microsoft replies:

One of the objectives of a product like Windows is to provide a uniform graphics environment which insulates the application from the hardware. That is, of course, the main objective of an operating system like MS-DOS. As a result of the usage of techniques like direct memory addressing we have seen the emergence of a "standard within the standard" — IBM compatible computers: As soon as you directly modify a memory location such as a memory-mapped screen, you are tied to hardware which has its screen-memory in exactly the same location. As soon as you try to run the software on a machine with a different memory map the software will cease to function correctly. If you write your application in such a way that it achieves its aims by using DOS calls then your software will run on any

MS-DOS machine since each implementation of MS-DOS is tailored for the particular machine.

One of the problems is that DOS itself does not contain graphic calls. As a result it has been necessary in the past to directly address memory in order to do graphics on an MS-DOS machine. The introduction of Windows is an attempt to address the issue of graphics compatability between machines. By providing a uniform graphics interface (we term it a GDI — a Graphics Device Interface) Microsoft is making it possible for software which relies on graphics to be much more portable.

As Russell points out, this will require the co-operation of the applications programmer. It is not possible to prevent applications directly addressing a specific memory location but any software which makes use of such techniques will not

function properly under Microsoft Windows.

Microsoft Windows makes use of a technique called non-preemptive multi-tasking; i.e. Windows will never take control of the CPU but if application gracefully relinquishes control of the CPU then Windows will distribute CPU resource to other applications using a "message queue". It is also possible for a program to place a message in the queue for itself or for another application. While this technique will not allow several programs to be active at one time (remember that we are still using a single-user, single-tasking operating system) it will allow "context switching", i.e. you can switch from one application to another with a keystroke.

Windows will, of course, allow you to run a "conventional" application and by the use of a PIF (Program

Information File) can determine whether the application being run is one which it can run in a window (as opposed to under Windows). If the application is one which is "well-behaved" in terms of using MS-DOS calls, then Windows will re-direct screen I/O to a window but if techniques such as those described by Russell are used, then no redirection is possible and Windows will let the program "take over" the CPU and screen.

One of the most important reasons for writing Windows applications is that when a version of MS-DOS which supports the protected mode of the 80286 is released, conventional applications will require extensive modification to run, and to use the full addressing space of the 80286 (proposed 286-DOS running on an 80286 in protected mode will free us from the 640K memory limit).

However, programs written for the Windows environment will be able to function under 286-DOS with little or no modification at all.

From the electronic mailbox

I would enjoy reading more technical articles in PC Australia, such as the differences between the 8087 and the 8087-2 coprocessors and descriptions of the various BIOS chips used in clones and their capability with the IBM chips. Otherwise a great magazine.

James Gow
Viatel No. 917313560

Beautiful! That one word sums up the entire magazine. I think that your idea of putting the listings on disk is one of the best ever. Maybe you could next put them onto Viatel as telesoftware. Keep those good articles coming, and how about a review on Turbo Prolog?

Garry Aydon
Viatel No. 557255470

I am glad that you mentioned telesoftware as I believe that this is a major feature of videotex which has remained (so far) largely unexploited. I suggest you keep an eye on Viatel's "What's New" pages.

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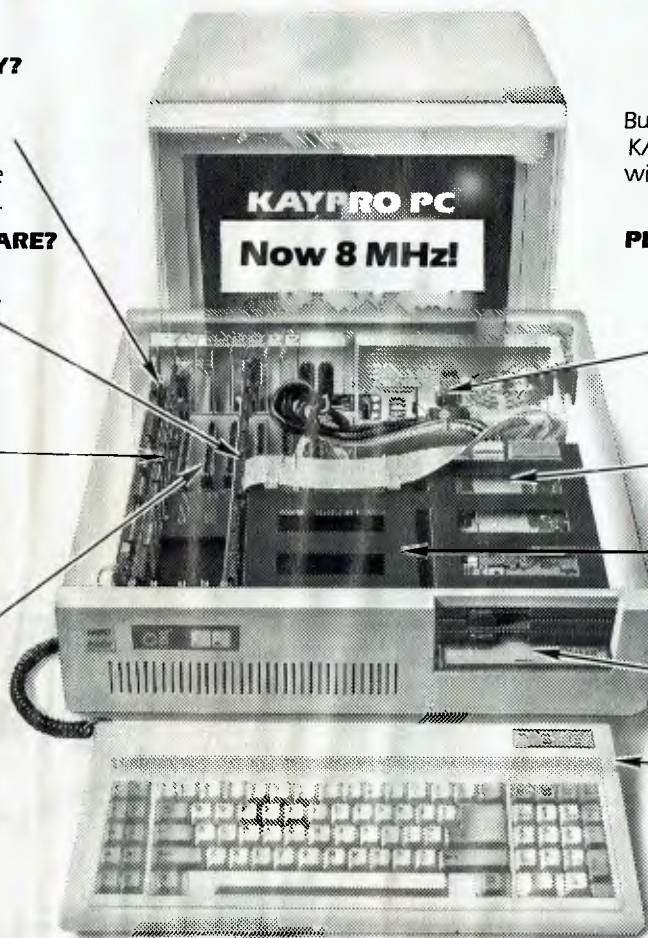
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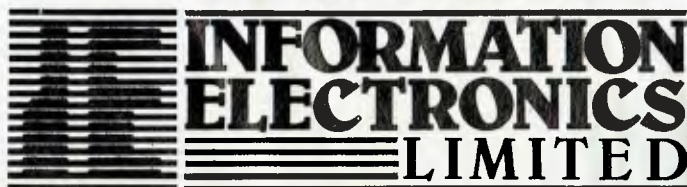
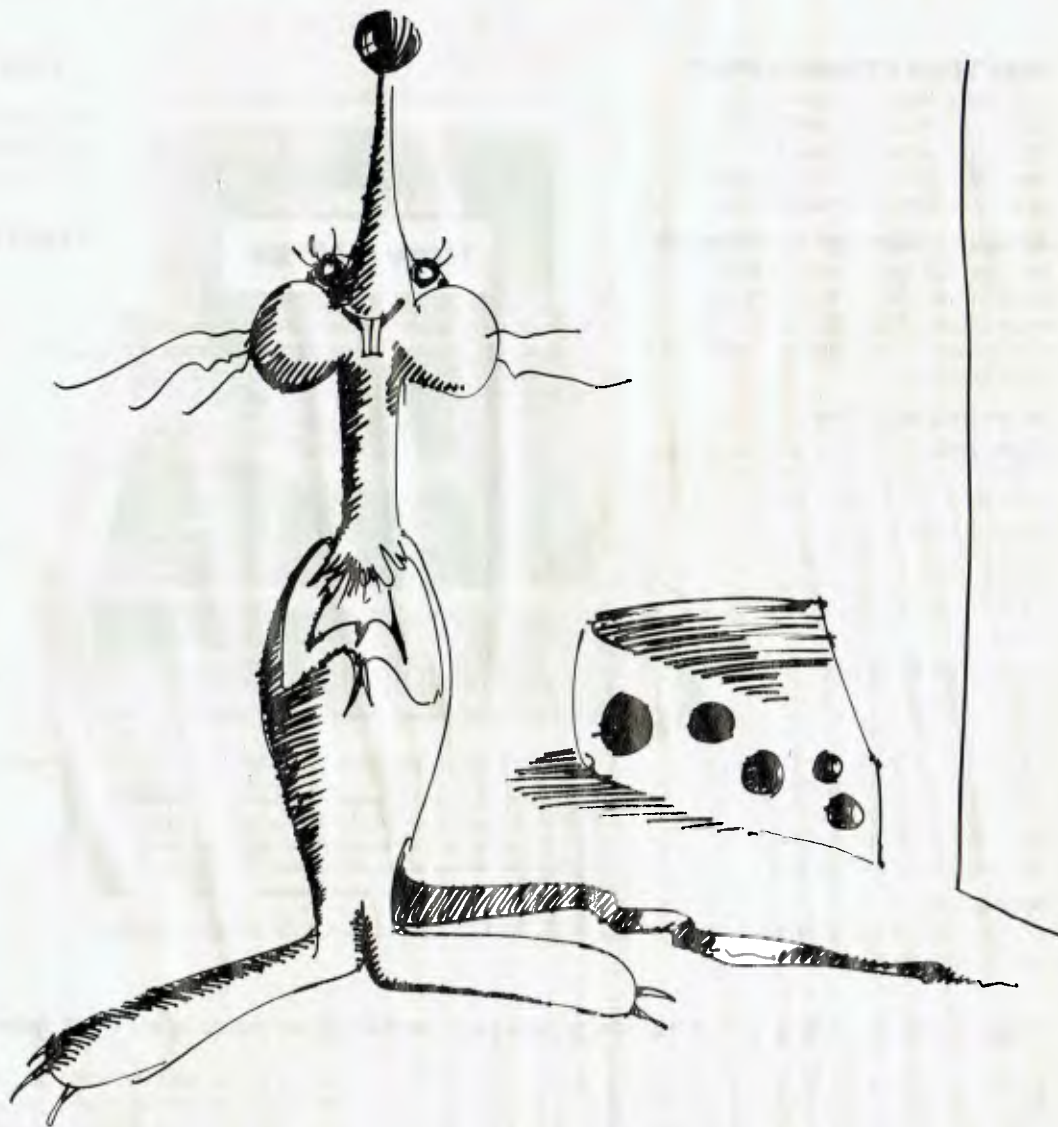
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A corporate cat

The Televideo TeleCAT-286 is another high performance AT clone. Like the IBM PC AT it is large and heavy, although its footprint is substantially smaller (measuring roughly 41cm square). The 350mm high-resolution monochrome monitor is easy on the eyes and features an integral tilt and swivel base.

The review unit was taken from a random sample of production systems but had been upgraded to 640K of RAM (512K is standard) and can be expanded to a megabyte on the motherboard. It included a 1.2M floppy disk drive and an inbuilt 30M hard disk. Like the IBM machine, the TeleCAT uses the Intel 80286 and accepts the 80287 maths coprocessor. Unlike the AT, this machine runs at 8MHz although it can be switched back to 6MHz for timing-critical programs. The standard system includes one serial and one parallel port, a color graphics card, the monochrome screen plus MS-DOS 3.1 and GW-Basic 3.1 with corresponding documentation.

Inside the system unit are five expansion slots, one of which accepts standard IBM PC boards. The other slots meet the 16-bit bus requirements of the IBM PC AT. There is plenty of room inside for a streaming tape drive or increments of memory up to a maximum of 15M. The 140W power supply is switchable to either 115 or 240 volts mains supply.

The floppy disk drive is similar to that of the AT. It can also read and write standard 360K formatted disks but since the track width is substantially smaller than that of a normal 360K drive, there may be difficulty in reading the data on another machine.

There are a few cosmetic differences. There is no key-operated power switch, instead there is a simple rocker switch above the mains socket.



The Televideo TeleCAT-286: not the fastest hard disk system but certainly well up front

The secondary switched power outlet beside the switch goes begging since the monochrome monitor derives its power through the signal cable. A wise precaution is to check pin connections before hooking up another manufacturer's display unit. Like the AT, the TeleCAT has no external reset button, an annoyance when recovering from a "lockup".

The keyboard has its LED indicators in the keys rather than isolated in a separate bezel. The keyboard feels good although there is no positive tactile or acoustic feedback.

The monochrome monitor has a graphics resolution of 640 by 400 pixels and displays colors as varying shades of green. The character set is crisp and sharp and ideally suited to long sessions in front of your favorite word processor. The color graphics card comes with 32K of

RAM for four colors, expandable on board to 128K for all 16 colors.

I breathed a sigh of relief to find that the hard disk was already formatted and bootable. Indeed, a rather cute demonstration is called up from the AUTOEXEC.BAT file. The relief stems from the fact that installing DOS on a new hard disk can be a nightmare without adequate system documentation. Although there is a DOS handbook, it appears to be a reprint of a Microsoft edition with no references to system generation. The software is on three floppy disks; the demonstration program, GW-Basic and MS-DOS (or "TeleDOS").

My benchmark tests consist of the compilation and linkage of a PL/I program for locating prime numbers using the familiar Eratosthenes sieve technique. These two steps provide a disk-intensive test while the execution

of the program tests CPU performance. It does not test any optional numeric coprocessor.

As may be seen from the results listed below, the TeleCAT performs well. It is not the fastest hard disk system but it is certainly well up front. At 8MHz, its processing speed is on a par with similar 80286 systems and that is fast.

The ROM BIOS is Televideo's own. Although providing MS-DOS and GW-Basic there is no other (bundled) application software. To date, we have not yet reviewed an AT clone which includes applications other than demonstrations. Again, that is no criticism, rather a reflection of the market's demand.

I ran a number of my own standard application packages, including WordStar 3.3 and 2000, Lotus 1-2-3 and SideKick. They performed as expected, but I had no joy from Jet or

the Microsoft Flight Simulator. The problem is my software demands an RGB monitor. There are only two manuals: MS-DOS and GW-Basic. There was no system-dependent documentation.

Manufactured in Korea under licence from Televideo in the US, the TeleCAT-286 is available here from

Data Peripherals authorised dealers and value added resellers. It comes with a 90-day parts and labor warranty.

This machine is targeted at corporate users who need a PC workstation with "better" performance and a well-known name behind the product.

TeleCAT-286

Basic configuration

Processor:	80286
Clock speed:	8MHz (or 6MHz switchable)
Standard RAM:	512K expandable to 1M on main board
Maximum RAM:	15M
Ports:	1 parallel centronics, 1 serial RS-232C
Display screen:	High resolution green screen
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Ratings 0 (Poor) to 5 (Excellent)

Hardware compatibility:	4.4
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Best points: Speed, screen legibility.

Minor gripes: Documentation, no reset button.

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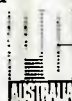
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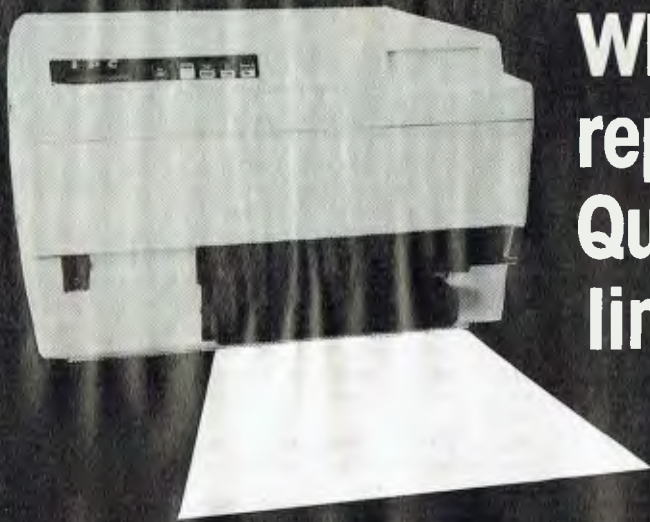
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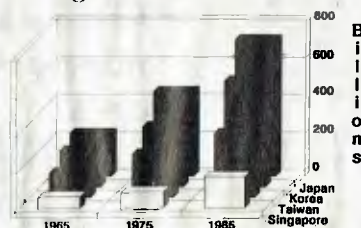


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four character sets; a further eight
sets are available and may be "on
line" at the same time.

Optional font cartridges further
extend the range. *Very simple
commands* are all that is needed to
use these character sets with your
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the Impact transforms existing fonts
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The Impact can generate a wide
variety of output *to your specific
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photographs, *even your signature!*

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MS-DOS programmes are aimed at the IBM-PC and close compatibles. The NEC APC III will often require the software library extension card to be able to execute these programmes. Documentation is included on the disks where required — often it is very extensive. Unfortunately, we are unable to provide telephone tutorials on using the programmes.

MS-DOS disks are formatted for standard MS-DOS 2.11 360K. Testing has been carried out for CP/M disks on a Z80 Kaypro II. About 120 different formats are supported, including Kaypro, Osborne, Tandy, Microbee, Bondwell, Commodore 128, Tele-video and Apple II, but not Commodore 64.

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News

Hercules gets aggressive

With the introduction of the new Hercules Graphics Card Plus, local distributor Tech Pacific has slashed the price of the older Hercules Mono Graphics Card by 46 per cent to \$594 but there is no sign it will no longer be available.

The Hercules Graphics Card Plus (pictured below with the

Hercules president, Kevin Jenkins) is a high-resolution monochrome adaptor based on the earlier board's resolution and font characteristics but modified to allow text and graphics display on a single screen. A proprietary technology — RamFont — allows up to 24 different fonts to be displayed in text mode simul-

taneously. RamFont is made possible by a Hercules VII2 video processor chip which incorporates 12-bit character encoding.

The Graphics Card Plus comes with Fontman software to create and edit customised fonts. More than 25 sample fonts are provided, which load into RAM

when specified. This means that users get the flexibility of PC graphics with the increased speed of text mode, albeit limited to monochrome.

The Hercules Graphics Card Plus will retail for \$675, and includes software drivers for most popular software packages and font editing software.



TOP TEN

Regular Top Ten watchers will notice there has been quite a bit of movement since last month's list was published.

Only the top two, Lotus 1-2-3 and dBase III Plus remain unmoved. Multimate returns to number three after dropping down the list in recent months due to supply problems. IBM Displaywrite III is still there, after a brief exit, and the accounting package, Integrity, makes its debut at number ten.

June is generally the strongest month for software distributors, as business tends to make big purchases before the start of the new financial year in an effort to beat the expected price rises. Unfortunately this June was not the usual bumper month for the suppliers due to the unsteady Australian dollar, and total software figures were 11 per cent down on the figures for May.

APCON time again

The PC User Group in Sydney holds its annual APCON convention on September 23 and 24 at the Masonic Centre in Sydney. The keynote speaker will be Robert Carr, chief scientist at Ashton-Tate and the author of Framework and Framework II. Carr's address is entitled 'Integration versus disintegration' and will focus on the relative merits and disadvantages of combining multiple applications into a single product.

PC Australia magazine will be

well represented as Les Stein, Ron Pollak, Bill Bolton and Ian Robinson will all be speaking during the conference. Other speakers include Brian Killen of Data Peripherals, Mark Richards of Dimension Graphics and Keith Miller from Microsoft.

Following each talk the user group will demonstrate a selection of appropriate PC applications relating to that subject. A final panel session will feature all the speakers who will answer questions.

- | | |
|--------------------|------------------------------|
| 1 Lotus 1-2-3 | — Lotus Development Corp. |
| 2 dBase III Plus | — Ashton-Tate |
| 3 Multimate | — Ashton-Tate |
| 4 Word | — Microsoft |
| 5 Displaywrite III | — IBM |
| 6 Open Access | — Software Publishing Inter. |
| 7 Crosstalk XVI | — Microstuf |
| 8 Multiplan | — Microsoft |
| 9 WordStar | — Micropro |
| 10 Integrity | — Integrity Software |

The PC Australia Top Ten is derived from monthly surveys of more than 240 third party software outlets by Compass Research as part of its Micro StoreBoard Project. The above ratings are based on figures for June 1986.

Roland aims at wide CAD appeal

Roland has released a comprehensive fully-optional computer aided drafting (CAD) kit which has been designed so that first time users of CAD do not have to go through the complicated process of learning the entire system before they can use it. The kit is aimed at draftsmen, engineers, architects or graphic designers.

Roland hopes the package will also appeal to more office

oriented businesses and those who need to prepare graphics for reports and presentations. The system will take the output of spreadsheets, such as Lotus 1-2-3, and generate charts, graphs and other graphic forms with a minimum of data reshuffling (see pictures below).

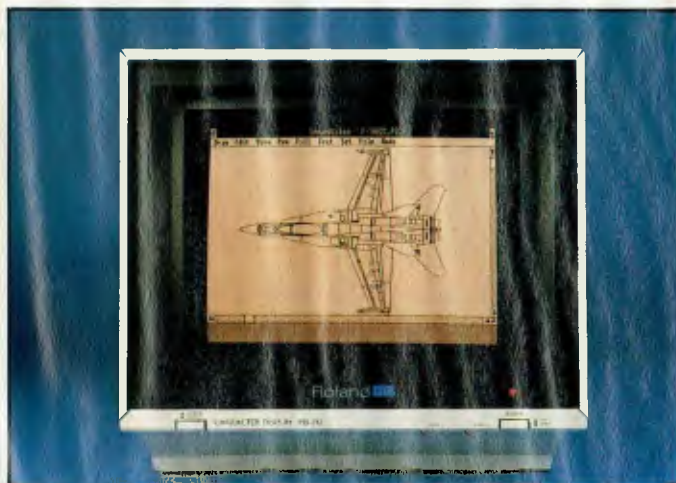
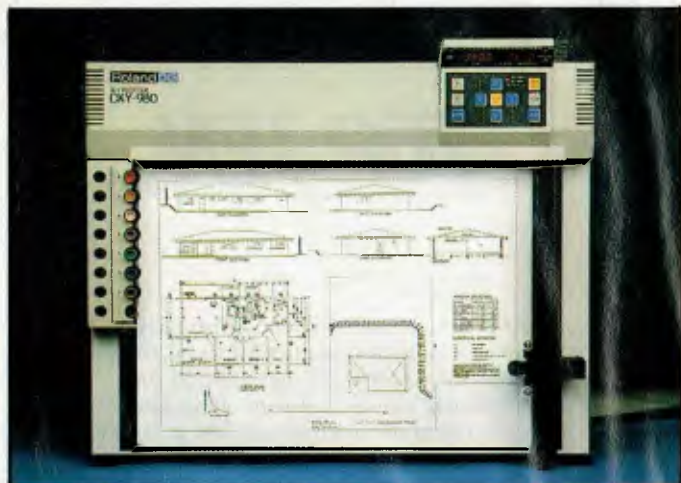
The kit has been designed for users of the IBM PC, XT, AT and compatibles. It incorporates the In-a-Vision software which

Roland claims makes the package simple to use, Microsoft Windows, a Microsoft Mouse and the Roland DXY-980 A4 eight pen plotter. The software has been written within the Microsoft Windows environment. Relevant menus and help instructions for each stage are available through a "pull down" menu system.

They can be held on the screen while the user continues to draw,

covered over with other windows or a draft drawing held on the screen for reference or editing. The output to the plotter does not involve complicated computer operations, as the software already includes the drivers for the Roland plotter.

Although the items in the package are individually priced at more than \$4500, the kit is available from Roland dealers at an introductory price of \$3500.



Australian-made EGA board

Australian manufacturer Hypertec has announced the latest addition to its range of PC expansion products — the Hypervid multifunction board. Hypervid supports EGA (640 by 350) graphics, as well as standard color graphics and monochrome displays and also incorporates 512K RAM (in addition to the 256K of video RAM), serial and parallel ports and a clock/calendar chip. Another serial port can be fitted.

Hypertec has been steadily building up expertise in multifunction board design since the release of its first Hyperam board last year. The new Hypervid

incorporates the same CTI chip set used by most other EGA clone boards, but has more multifunction features than anything else on the market. In addition Hyperam includes a disk of utilities for print spooling, disk caching and RAM-disk installation.

With its unique multifunction features and aggressive recommended retail price of \$1450, the Hypervid looks set to successfully take on the many imported EGA clone cards appearing in Australia. The demand for EGA compatibility is increasing both in new PC purchases and in those sites intending to upgrade.



The Hypervid multifunction board: more features than anything else on the market.

Drafix 1. For \$695 you can draw your own conclusions.

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Powerful, full-featured second generation CAD software.

Drafix 1 offers all of the capabilities you expect to find in packages costing \$4000 or more.

This is not simply a souped-up paint package. Drafix 1 is a breakthrough in design that organizes sophisticated CAD functions into smooth, fast operations. All of the drawing, designing and editing functions that designers demand from a serious CAD tool are included in Drafix 1.

A breakthrough in screen design and visual user interface.

Drafix 1 features the best organized screen design ever devised. Very simply, it displays all the information you need, all of the time.

The entire menu hierarchy is displayed constantly. There's no need to memorize commands or search for menus.

Snap-mode options are continually shown on the left screen border and can be selected "on the fly" by either pointer

device or a single keystroke. Roll-down screens provide quick access to the virtually unlimited drawing, display and editing options.

And it's all controlled by a versatile three-button mouse, or digitizer, with on-screen prompts so each button function is clearly defined.

AutoCAD® compatible for easy expansion.

If you or someone in your company already uses AutoCAD, Drafix 1 offers an inexpensive way to add to your capability.

The optional Drafix 1 / AutoCAD file exchange utility permits transfer of drawings between Drafix 1 and AutoCAD.

It's the perfect, low-cost alternative for increasing your drafting and design capacity.

Find out just how good CAD software can be. For only \$695.

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Free source code in every box.

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Apricot moves upmarket

At last Apricot Computers has released a top-end XEN microcomputer system with full IBM AT compatibility.

The Apricot XEN-i, (below) distributed in Australia by Barson Computers, combines the performance of the Apricot XEN with access to the worldwide library of IBM standard software.

With an Intel 80286 processor running at 10Mhz, Apricot claim the XEN-i offers approximately 30 per cent greater performance than the latest IBM AT.

The single motherboard design uses nine customer gate arrays, giving XEN-i compact dimensions and enabling Apricot to integrate as standards features that require five additional boards on equivalent IBM products. Full IBM AT compatibility is provided by an integral Phoenix BIOS device.

The most powerful XEN-i, the

XD, has a 50M fast access disk and 2M memory as standard. The 20M HD is equipped with 1M of memory. Integrated features of the XEN-i include a page memory mapper designed to the Intel/Microsoft/Lotus standard. This enables applications to exceed the normally restricted 640K RAM and to use XEN-i's full memory.

For applications unable to exceed the IBM limit this facility allows memory above 640K to be used as an electronic RAM disk, while XENIX programs can address all of the RAM on the board.

Other options are the XEN TEL telephone management system, a 80287 floating point co-processor, an external 20M tape drive and an external 5 1/4 inch floppy disk drive.

The price of the XEN-i starts at \$10,000. The workstation model is available for \$3000.



The Open Access encore



One of the few integrated software packages to enjoy any long-term sales success has been revamped. Local distributor Software Suppliers has announced Open Access II, a combination database, spreadsheet, graphics, communications and word processing package.

Open Access II features a relational database with 10 key fields a record and SQL retrieval and allows either 'paint the screen' design or a database programming language. The 3000 row by 216 column spreadsheet features a macro programming language and a range of business, trigonometric, date, time and lookup functions. A wide variety of graph types can be displayed.

The communications module

of Open Access II supports both XMODEM and Kermit protocols and features a private bulletin board system. Smart modem commands are supported and data encryption and password protection are possible for all services.

The word processor can perform mail merges, import data from any other module (including graphics) and store customised document formats.

The Open Access desk accessories (calculator, alarm clock, appointment scheduler and note pad) are accessible from any module and conversion utilities are provided to import and export data from other popular software. Drivers are included for more than 100 output devices.

The latest Word

Microsoft has further upgraded its popular word processing package to include built-in outlining and enhanced printer support. Word 3.0 has launched in Australia recently, along with the Microsoft Access communications utility and version 2 of

the QuickBASIC compiler.

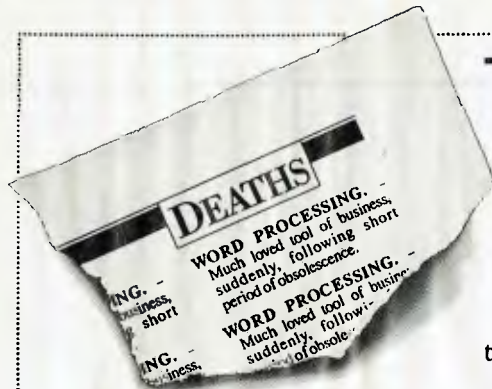
Word 3.0 features a fully-integrated outline processor, mathematical and sorting functions, drivers for more than 70 different printers, downloadable laser printer fonts, index generation, DCA conversion, EGA

support and does not incorporate copy-protection.

Microsoft Access is a sophisticated communications package which has filled a nagging gap in the company's software armoury and with products such as Microsoft's Crosstalk regularly appearing in the Top Ten, it was only a matter of time before Microsoft moved in. Ease-of-use, flexibility

and customisation are its strong points, although it suffers in the local market by not offering videotex capability — but neither do any of Microsoft's US competitors.

Word 3.0 retails for \$735, and existing Word 2.0 owners have the option to upgrade to the new version for \$125. Microsoft Access will retail for \$425.



The word processing program has died.

WORD PROCESSING PROGRAMS, as the world knows them, have passed away.

In their place: a word processing prodigy.

New Microsoft Word 3.0, with its host of unique and brilliant features, means you can produce business plans, proposals, contracts and correspondence much easier, much faster and much more cost-efficiently than ever before.

It's the first serious business application that you don't have to learn. It teaches you. Via an acclaimed training course that comes as part of the package and that you run on your computer.

Microsoft Word is designed for IBM PCs and compatibles by the world's largest, longest-established microcomputer software organisation. Microsoft is to software what IBM is to hardware. Indeed, Microsoft designed the IBM PC operating system.

New Microsoft Word 3.0 drives all the popular laser printers – and over 100 daisy wheel and dot matrix printers.

Consider the features of this word processing prodigy:

☐ It can process your thoughts before it processes your words, allowing you to rapidly create a document of compelling, competitive clarity.

You brainstorm ideas and list key points – all at random. Then, you rearrange these random headings and sub-headings into an ordered outline.

☐ It can automatically generate a Table of Contents – even an Index.

Anything less is, suddenly, less than professional.

But, how long does it take a typist to perform this tedious task, to number pages and then type up a contents?

☐ It can automatically and instantly add, subtract, multiply, divide and percentage numerical tables.

☐ It can automatically and instantly sort columns of text. Alphabetically, numerically, alphanumerically...you (or your secretary) name it.

☐ It lets you see on the screen what you're going to get on the page. With new Microsoft Word, bold type looks bold.

Italics look italic.
Superscripts and subscripts look like this.

☐ It lets your company set style sheets,

so that documentation format can be standardized and drudge typing – as bad for corporate morale as it is for corporate profits – can be reduced dramatically.

☐ It can read existing text files of all popular word processing programs. So conversion to new Microsoft Word 3.0 can be as automatic as everything else it does.

☐ It even lets you write side-by-side paragraphs.

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☐ I do not use a personal computer but please send me more information.

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MICROSOFT® WORD

Brighten your screen with living color

Suddenly EGA boards are everywhere, using different approaches to achieve the same result; brilliant colors and crisp text. Charles Petzold looks at a few

Many of you use a PC equipped with a basic green monochrome monitor and a monochrome display adaptor. Some of you have added a Hercules Graphics Card so that you can see what you are doing to your 1-2-3 graphs. Some have invested in a color monitor and a color/graphics adaptor. A few of the more adventurous (and well financed) among you have splurged on an enhanced color monitor and an enhanced graphics adaptor.

And therein lies the problem with displaying graphics: Everybody has got something different. Designing software with graphics that can play on whatever equipment is available is

both time-consuming and distracting, since creating a display is not usually the primary objective of most software.

Late last year something happened that promises to alleviate the industry's embarrassment of graphics standards. That something was the popularisation of the enhanced graphics adaptor, usually called EGA. In a matter of months, available EGA boards increased from a restricted supply of single, fairly expensive model made by IBM to more than a dozen fully compatible models made by independent manufacturers.

When IBM introduced the PC in 1981, color graphics were not considered an important or even

relevant aspect of business computing. In fact, computers that featured color graphics, such as the Apple II, the Radio Shack Color Computer, and the Commodore 64, were largely viewed as home computers. IBM did not set out to build a home computer and so it focused on producing a computer for which it believed the standard would be an 80-character by 25-line monochrome display. But IBM did not want to completely ignore the home and educational markets so it offered as an option a color/graphics adaptor (commonly known as CGA) that was capable of displaying four basic colors in resolutions of 640 dots by 200 lines and 320 dots by 200 lines.



NetComm's 4 Speed Auto Compact leaves all other modems at the line



It's another breakthrough from the fertile innovation of NetComm. The NetComm SmartModem 1234 is the first of a new range of modems to combine the multi-chip technologies needed to provide everyday low-speed operation with the super-fast requirements of major business demands, all in the one super-compact unit (it fits under your phone!)

The one modem now enables access to bulletin boards operating at 300 baud, Videotex services such as Telecom's Viatel at 1200/75 baud, as well as Packet Switching Networks including OTC's Midas and Telecom's Austpac at 1200 baud full duplex. In addition, the 2400 baud full duplex facility will enable high speed point to point file transfer, and access to data bases that will soon be upgrading to the new V22bis facility. This single, sophisticated modem supports auto-dial, auto-answer and auto-disconnect.

Another NetComm first!

The NetComm SmartModem 1234 is out on its own, and offers the business user the potential for significant reductions in telephone charges. It can be driven by most communications software programs, and connection is directly to a standard telephone socket. Ordinary stuff for an extraordinary performance!

So if your business is competitive enough to want to outsmart your rivals, you owe it to yourself to investigate the smartest modem on the market at the smartest price. The NetComm SmartModem 1234.

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QUEENSLAND Suite 6 Level 11 AMP Place 10 Eagle Street Brisbane Tel: (07) 229 7376

GRAPHICS

The marketplace decided, as it often does, that IBM's product introductions were not sufficient. IBM's monochrome display adaptor (MDA) could not display graphical images, and IBM's color card could not combine color with 80-column text.

Hercules Computer Technology soon offered a partial solution: the Hercules Graphics Card, a monochrome graphics adaptor that displayed graphics on a standard monochrome monitor at a resolution of 720 dots by 348 lines. Several other companies tried to develop higher-resolution graphics adaptors, but none were able to generate enough support from software developers to make its product a universal standard, as the Hercules card had become. As a result, by 1984 the industry was selling four different "standard" display adaptors for color and monochrome text and graphics, none of which allowed the display of both graphics and text on a single high-resolution

color monitor.

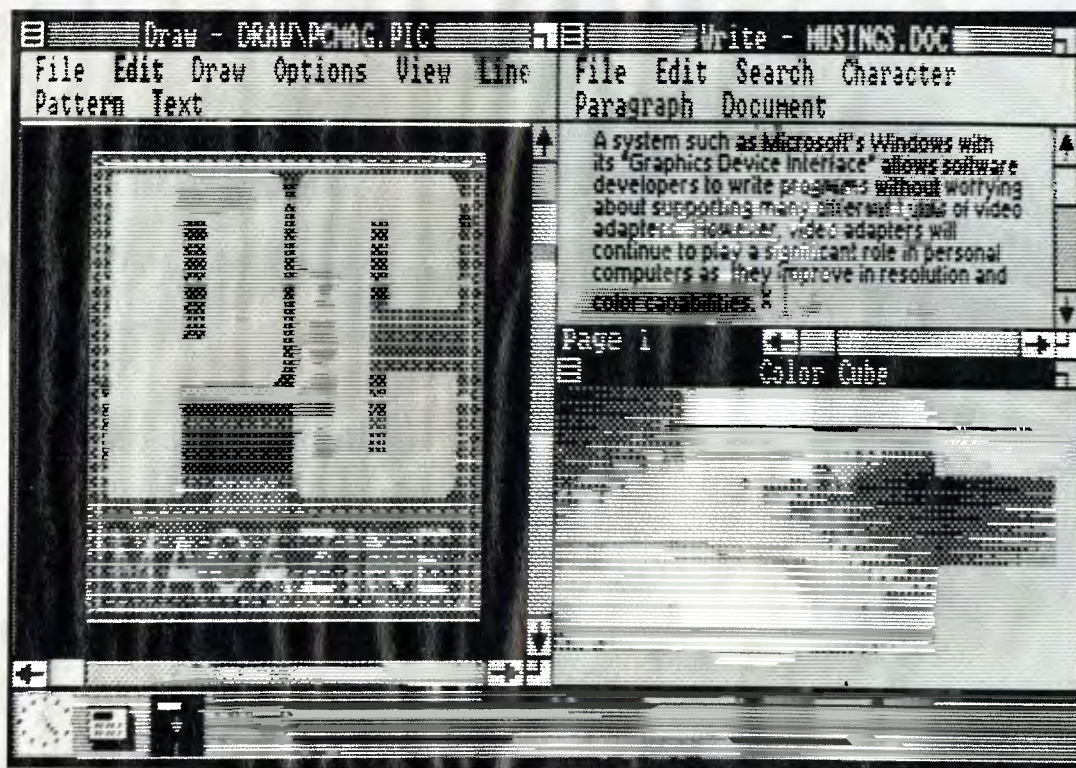
Meanwhile, Compaq Computer Corp., improving on IBM's design for the first time (but not the last), built into its computers a combination monochrome and color/graphics adaptor that could display both readable text and standard IBM graphics on Compaq's built-in monochrome monitor and let you plug in a color monitor to display color graphics. Compaq demonstrated to the industry that it was not necessary to put customers through the wringer if they wanted to display graphics, color, or monochrome. Compaq owners had to invest in a color monitor only if they wanted color.

The dissatisfaction within the industry did not amount to much, however, because the only company with the ability to create universally supported standards for IBM personal computers was IBM itself. Finally, in September 1984, just a month after IBM announced the PC AT, the PC

Network, and PC-DOS 3.0, it sneaked in an announcement of two new graphics adaptors: the Enhanced Graphics Adapter (EGA) and the Professional Graphics Controller (the latter, a very high resolution board suitable for CAD-type applications, is very expensive and has yet to catch on).

IBM's EGA is a long add-in board that can display 16 colors at a resolution of 640 by 350 (it can display graphics written for the older CGA at that adaptor's lower resolutions). With its higher resolution, it can also display readable text in one or more colors. The board comes with 64K of display memory (random-access memory that creates a buffer for graphic images waiting to be displayed) and can use as much as 256K of display memory installed on a daughterboard.

At first, customers met IBM's EGA with an enhanced yawn, for several reasons. First and foremost was its high price. Second, when IBM



The IBM Color/Graphics adapter works with Windows, if you call this working. This is a black and white high resolution mode of 200 lines by 640 dots.



introduced it, no software existed to take advantage of its features. Third, and possibly most frustrating, the EGA was just barely compatible with the CGA. Software developers, by

nature undisciplined and unrestrained, have played a number of tricks with the CGA, and IBM's EGA can not deal with programs that use those tricks. In addition, the board can not display graphics written to support Hercules's monochrome graphics.


In mid-1985, if you wanted to display high-resolution graphics but also wanted to be scrupulously compatible with every program developed, you had to buy two monitors (monochrome and enhanced color) and as many as three display adaptors. As a result, just a year ago, most people in the industry did not think IBM's EGA would become the much-anticipated high-resolution color graphics standard.

In September 1985 a startup company — Chips & Technologies (C&T) — announced its EGA CHIPSet, a set of four chips that handles the functions of 19 of IBM's

proprietary chips on the EGA. By November, at the huge Comdex trade show in Las Vegas, more companies had introduced EGA-compatible boards that offered a standard 256K of display memory and were based on C&T's EGA CHIPSet. At the same time, Microsoft finally released its long-awaited operating environment, Microsoft Windows (see PC Australia, 'Looking into Windows' June 1986) and emphasised that it supported the EGA as the standard for high-resolution graphics.


Several developments from manufacturers of EGA boards have made the PC owner's decision to add high-resolution graphics much simpler.

First, the new EGA-compatible boards all offer 256K of display memory as standard; the extra memory is important for displaying complicated images rapidly and for



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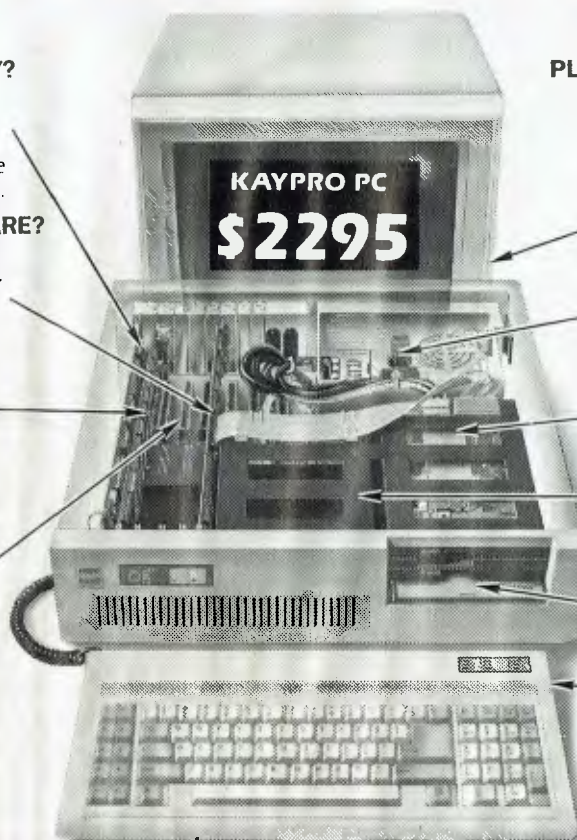
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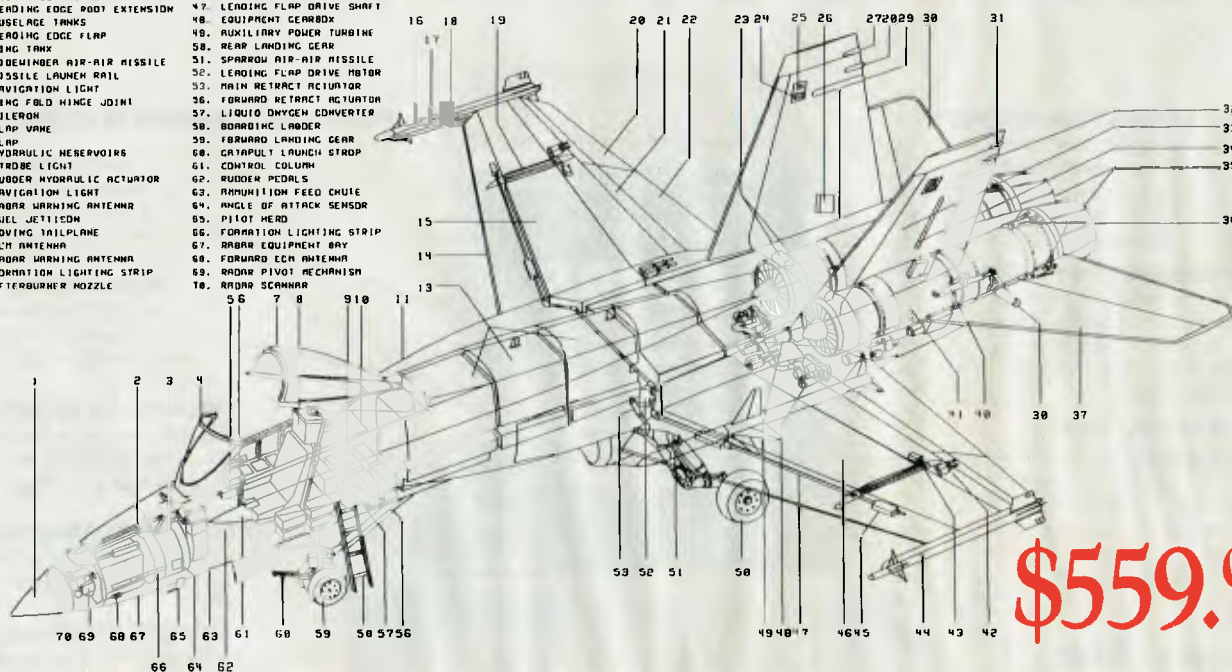
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scrolling images across the screen smoothly and quickly.

Second, the new boards have established a lower price as the norm. Indeed, as EGA-compatible boards get less expensive, the small difference in cost between buying CGA-compatible and EGA-compatible board-and-monitor combinations is likely to render the CGA virtually obsolete.

Third, several board makers have taken the extra step of building in separate and explicit support of both IBM color graphics and Hercules monochrome graphics. Some also include other features, such as a printer port. At the same time, some monitor manufacturers have built monitors that can operate at different frequencies and display color graphics at different resolutions with different adaptors without forcing you to switch monitors.

While it is still difficult to remember all of the possible configurations it is now possible to buy only one board and one monitor, on which you can run any piece of software — regardless of the type of graphics or text it supports — without having to remove the cover of your system unit to reset switches. You still need to remember to reset switches or use different CONFIG.SYS files for some combinations. But even that requirement may disappear: the Paradise Systems EGA board is able to switch from one display to another automatically.

You still need to be careful about upgrading to high-resolution color graphics if you rely on software that supports only the IBM color graphics standard. You will need either to buy an adaptor that can co-exist with your present color adaptor or replace yours with a multi-mode card, so that the CGA emulation is capable of running your software. You will probably also need to invest in a multi-frequency monitor, unless you want to stack your new monitor on top of the old one.

For all the glowing praise of the EGA, nearly everyone in the industry

agrees that the EGA standard is merely a stopping point on the way to something better. There is considerable disagreement about what that better thing is although there are a few indications now of future directions.

Future graphics standards must improve on the EGA with higher resolution, faster displays, and additional enhancements. Recently the industry was rife with rumors that

EGA Benchmarks

	Teletype	Teletype with scroll
AST-3GModel 1	12.1	17.8
EGA Master	12.1	17.7
IBM EGA	11.8	17.5
Sigma EGA1	8.8	14.6
QuadEGA Plus	8.6	14.1
EGA+	7.3	14.1
VEGA	8.1	13.7
Timed in seconds		

Teletype: The test is performed in video mode 3. The screen is cleared and 24 lines of 60 characters each (including a terminating carriage return and line feed) are written to the display through the BIOS Teletype routine. This is done 10 times.

Teletype with scroll: The test is performed in video mode 3. The screen is cleared and 240 lines of 60 characters each (including a terminating carriage return and line feed) are written to the display through the BIOS Teletype routine. Although the first 24 lines written to the display do not involve scrolling, all the remaining lines scroll the display.

IBM would replace its existing EGA board with one that would be less expensive, would include 256K of display RAM, and might offer up to 400 lines of vertical resolution. These enhancements will be an improvement but will not represent a completely new standard, as the EGA did. The next standard will have to offer significantly better resolution, probably in the range of 1024 by 1024.

The other improvement that will justify a new standard will be the speed of display. Even an EGA display takes a significant amount of time to redraw a complicated graphic. One technology that promises to improve the speed of graphics displays

is the graphics coprocessor. Like the 8087 and 80287 math coprocessors already available for PCs, graphics coprocessors will take some of the load off the main processor. Graphics routines and main logic routines can then be processed faster. Texas Instruments and Intel have already announced graphics coprocessors; both should show up on add-in video boards by the end of 1986.

Whether the industry continues to offer competing and incompatible designs or moves toward a single standard, at least now you can get both text and graphics on a single high-resolution screen display. And you can be pretty sure that you will not have to replace your graphics hardware or software for another 18 to 24 months.

The new standard

At first IBM's EGA was merely a high-priced video alternative for the PC, XT, and AT. Now it is a standard, as solid and as well-defined as the IBM PC.

IBM did not make the EGA a standard; it simply provided the model. Eleven other companies standardised the EGA by bringing their own IBM-compatible enhanced graphics boards to the market.

This sudden avalanche probably heralds universal software support for the EGA standard. While large software companies will continue to support a variety of video adaptors, those that are not able to support more than one will choose to support the EGA if their products involve graphics. Many publishers have taken the plunge already and we can now expect to see the EGA's 16 colors in 640-dot by 350-line resolution in graphics applications regularly.

From a purely technical perspective, the EGA standard is neither particularly innovative nor the final word in graphics cards. The IBM EGA has been called the minimum acceptable video adaptor for IBM PC use. For most PC users, however, an EGA-standard board is now the best

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choice for a video adaptor. The EGA is the right board and with manufacturers other than IBM selling EGA boards, it is now available at the right price.

IBM's EGA supports 12 video modes. The modes available to you and how they will look on the screen depend upon the amount of memory installed on the board and the monitor you attach.

On page 54, figure 1 summarises the video modes the EGA supports. Attaching an IBM monochrome monitor (or equivalent) to the EGA gives you two video modes. Mode 7 duplicates the text mode on the IBM MDA. Mode 15 is a graphics mode. Most programs that support EGA graphics will support this graphics mode since the memory mapping is the same as in the highest-resolution color mode.

If you connect an EGA to an IBM Color/Graphics Display, nine modes are available. Several are the same (modes 2 and 3, for instance) because the IBM CGA provides color and black-and-white versions of some video modes for composite video monitors. The EGA does not support composite monitors. The 40-column and 80-column text modes will look the same as they do with a CGA but the screen will not flicker when it scrolls. (The flickering of the CGA is

caused by software that turns off the display when updating video memory to prevent video "snow". This technique is not necessary with the EGA.) In addition, you get two new graphics modes, 13 and 14, with the same resolution as five and six respectively, but with 16 colors.

You will get the best results when you connect the EGA to an IBM Enhanced Color Display (or equivalent). All programs that use text modes will show an immediate visual improvement. Instead of the grainy 8 by 8 character box, you get a nice 14-by-8-character box, nearly as good as that of the MDA.

The best graphics mode available with an Enhanced Color Display is mode 16, with a resolution of 640 x 350. With 64K of memory on the EGA, this mode supports only four colors; 128K of memory or more gives you 16 colors. If you use Microsoft Windows with a 64K EGA, it will use the lower-resolution mode 14.

Attaching the EGA to an Enhanced Color Display offers another benefit. Although you will only be able to use 16 colors at a time, those 16 can be selected from a palette of 64. The EGA also supports alternative fonts and a 512-character set. Special programming can take advantage of soft scrolling, "horizontal pel (pixel) panning" (shifting the display slightly

to the left or right by less than a character width), and rudimentary windowing.

The nitty gritty

On a hardware level, the EGA is programmed for a particular video mode by the contents of more than 60 registers built into the board's video chips. These registers are programmed through output ports and their settings control all the timing variables (such as the number of characters displayed on a line), allow different memory mappings that duplicate the graphics modes of the CGA and select the colors.

Taking a cue from IBM, C&T's CHIPSet has divided the main functions of the EGA among four large integrated circuits. Different registers are associated with each of the four. A typical EGA board using the CHIPSet is shown on page 40.

In text modes, programs need not use these registers except to do esoteric things like soft scrolling (where text on the screen scrolls up or down by less than one character) or horizontal pel panning. However, in graphics modes, programming of the registers is nearly a necessity. Unlike in the CGA, display memory in EGA graphics modes is not mapped directly into the CPU memory. The manipulation of EGA registers gets

EGA Boards BIOS performance

Product Manufacturer	Reboot on IBM PC	Teletype scroll calls	No. of characters in same font as IBM		Font-change problems		
			8x8	14x8	Monochrome underline	ECD cursor	Automatic font set on mode change
IBM EGA IBM Corp	Long	Re-entrant	256	256	Gone	Gone	Wrong number of lines, no cursor on ECD
AST-3G Model 1 AST Research	Short	Re-entrant	239	251	Gone	Gone	Blanks out
EGA Plus STB Systems	Short	Re-entrant	92	94	Gone	Gone	Unreadable font, sometimes crashes
SigmaEGA1 Sigma Designs	Long	Internal	256	256	Gone	Gone	No cursor on ECD
QuadEGA+ Quadram Co.	Long	Internal	256	255	Gone	Gone (except No cursor on ECD if 25 lines)	
VEGA Video-7	Long	Internal	256	255	Gone	Gone (except No cursor on ECD if 25 lines)	

Figure 4: Some of the differences among the workings of the EGA BIOS.

Anatomy of an EGA Board

Packing all the functions of an EGA onto a 5-inch card hardly seems possible, yet the Video-7 VEGA board makes it look easy and even beautiful. Most of the work is done by the four-chip C&T Enhanced Graphics CHIPSet (the chips numbered 82C43x). Programmable logic arrays and surface-mount technology also help to keep the size down.

1. The 82C431 graphics controller controls the transfer of data between the video memory and the CPU when a program is writing or reading to the

adaptor, and from the video memory to the Attributes Controller for the display of text or graphics.

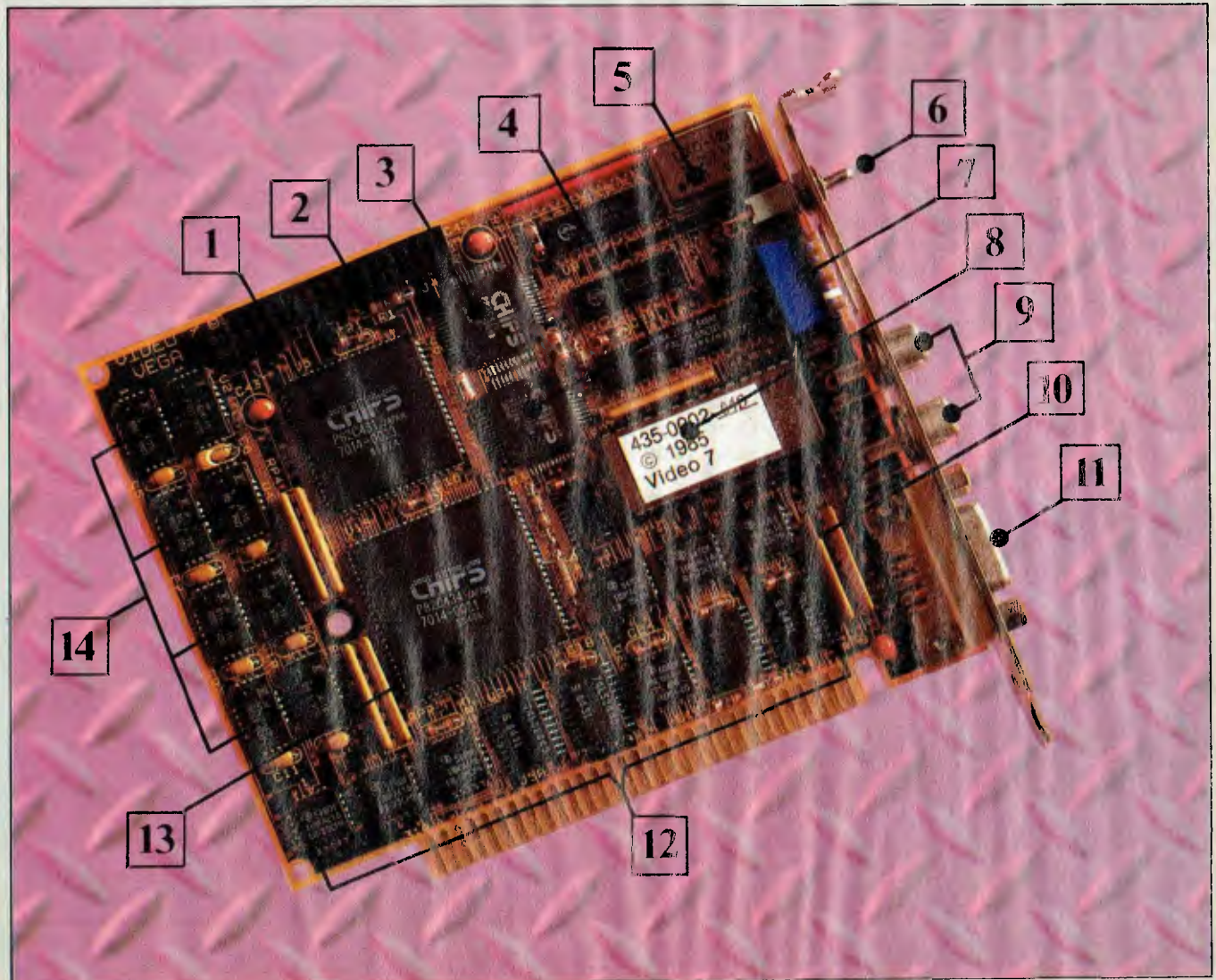
2. The feature connector provides external devices with access to many of the board's important timing and output signals and substitutes the device's own video signals for those generated on the board.

3. The 82C433 attributes controller controls the mapping of the 16 color attributes to the 64 possible EGA colors while generating the final signals sent to the video display.

4. The 82C432 sequencer generates signals for controlling memory access.

5. The 16.257-MHz crystal generates the dot clock and other timings for all EGA video modes that use 350 scan lines. The 14-MHz dot clock for 200 scan-line video modes come from the PC system bus. This clock determines the rate at which individual dot signals are sent to the display.

6. On most boards, the monitor type is selected by a jumper connection, but the Video-7 board uses a toggle



switch. One position specifies that an Enhanced Color Display is attached to the board; the other position indicates a color/graphics or monochrome display.

7. The DIP switch settings tell the BIOS what type of monitor is attached, whether the EGA is primary or secondary and what video mode should be in effect during power up.

8. The ROM BIOS does not directly control anything on the board. It initialises the board during booting, provides a medium-level programming interface to board functions, and contains fonts that are loaded into memory for text modes.

9. The two RCA jacks are attached only to the feature connector and have no direct function on the board.

10. The light pen connector is compatible with that on the CGA board.

11. The monitor is attached to this **Video Output Connector**.

12. Other integrated circuits provide an interface between the system bus and the video chips.

13. The 82C434 CRT controller generates most of the synchronisation timings for the video display. Registers on this chip control the number of characters per line, the number of lines per screen, the number of scan lines, and the cursor position.

14. Each chip in the display memory stores 64K four-bit values for a total of 256K. In graphics modes, each of the four groups of 64K stores the dot patterns for a particular color plane. In text modes, the memory stores the ASCII character codes, the attribute (or color) codes, and up to four different fonts with dot patterns for 256 characters each.

the video data into the correct locations.

For hardware compatibility, C&T had to duplicate most of IBM's EGA registers on its own chips so that identical programmed values caused identical results. Manufacturers of EGA boards using the CHIPSet have to wire the chips up correctly and build in some additional register compatibility. Although C&T provides a sample circuit design to implement a complete EGA board, most manufacturers design their own.

Not all EGA boards that use CHIPSet are created equal. Beyond hardware compatibility, the individual manufacturers must also ensure software compatibility through a BIOS (Basic Input-Output System), which is a program encoded in a ROM chip on the EGA board. PCs with system BIOS dates earlier than 10/27/82 will not recognise this EGA BIOS. This BIOS has three major functions:

- ☐ It initialises the EGA board by programming the registers when you first power up or reboot the PC and when a program changes video modes.
- ☐ It creates a high-level interface (through software Interrupt 10H) for other programs to use the EGA. Many of the Interrupt 10H function calls are compatible with those on the system-board BIOS for the IBM MDA and CGA.

- ☐ It contains the fonts used for displaying characters on the display. The monochrome and CGA's use text-mode fonts stored in a ROM on the video board, but the EGA has no on-board font. The font must be loaded from memory into the board.

The IBM EGA's BIOS (and the BIOS's of all the other cards reviewed here) is 16K long. This is twice the size of the 8K system-board BIOS that serves for an entire PC or XT (excluding the hard-disk BIOS extension). However, the length of the EGA BIOS is a little deceptive, since more than half is used for storing fonts, video parameters, and other information.

IBM's BIOS is proprietary, and although a full listing is published in the EGA's Technical Reference manual, any company that attempted to put IBM's on its own EGA boards would soon hear from IBM's lawyers. Manufacturers must therefore duplicate all the functions of IBM's BIOS without directly duplicating any of the code.

What makes this situation more interesting is the sorry state of IBM's EGA BIOS. It contains several bugs and undocumented quirks, compounded by errors in the EGA Technical Reference manual. These problems create a dilemma for EGA manufacturers. Should they attempt to correct the bugs and release an EGA with a BIOS that is better than IBM's? Or does compatibility with the IBM EGA standard mean duplicating IBM's bugs — either ignorantly or deliberately — under the assumption that applications software will adapt to these bugs and even rely on them?

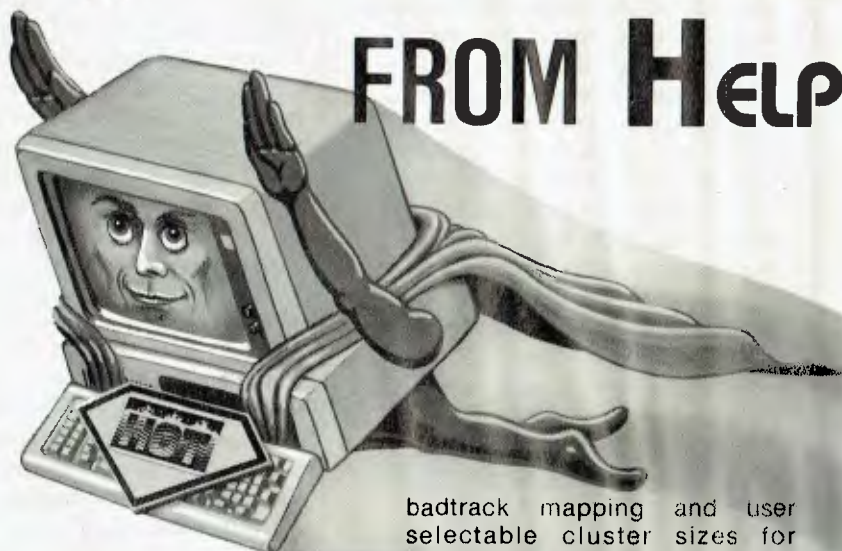
In general, the latter approach has predominated. Too many programs already have become "EGA aware", and one person's bug is someone else's feature. Being IBM-compatible has even meant that manufacturers must embed the letters "IBM" into the BIOS's of non-IBM boards.

Unlike IBM, most of the manufacturers continually update their BIOS code — sometimes, it seems, weekly or even daily. In figure 3 (page 56), I have indicated the version number of the BIOS in each board I tested. Everything in these reviews is based on those BIOS versions, and I have no knowledge of previous or later BIOS versions. If you have, or plan to buy, one of these boards, you may want to check the BIOS version yourself (see over page).

Beyond Compatibility

Early users of the IBM EGA found that the board easily ran most software designed for the CGA and MDA. Unfortunately, "almost all" did not include the two software packages used most often to test IBM compatibility: Flight Simulator and 1-2-3, Release 1A's graphics. The

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1-2-3 incompatibility (and Lotus's long delay in developing new EGA drivers) was a serious problem and probably the factor that most inhibited immediate corporate acceptance of the IBM EGA board.

The CGA and MDA both use the Motorola 6845 CRT controller chip, but the IBM EGA does not. IBM's Technical Reference documentation for the CGA states that the Motorola 6845 CRT controller "is highly programmable with respect to raster and character parameters. Therefore,

many additional modes are possible with clever programming of the adaptor".

Although IBM went to great lengths to make the EGA mimic most of the operations of the CGA and MDA, it did not precisely duplicate the 6845 registers, the mode-control register, and the color-control register ports. The most-useful CGA and 6845 registers (the status port, the starting address, the cursor position, the cursor size, and the light-pen registers) are duplicated on the EGA, but little

else is. Programs that set the video mode and colors through the BIOS usually run well on the EGA. Those that do it directly (like 1-2-3, Release 1A's graphics and Flight Simulator) throw the screen into chaos.

Although software rarely manipulates the 6845 registers of the MDA, the EGA has another problem with the monochrome display because it interprets character attributes differently to the MDA. Some programs use the same color attributes on the CGA and MDA because they usually look fine on both. On an EGA attached to a monochrome display, however, many of them are not visible. (Both of these problems are clearly documented by IBM in the EGA Technical Reference.)

One other video board has achieved enough widespread use to be classified as a standard: the Hercules Graphics Card. The Hercules card is capable of graphics resolution of 348 lines of 720 dots on a monochrome display. The Hercules also uses a 6845 CRT Controller. Since IBM rarely acknowledges standards other than its own, the IBM EGA does not support the Hercules standard.

Now, perhaps, you can understand

Checking the BIOS version

Most of the differences among EGA boards are found in the BIOS, a program encoded in a ROM chip on each EGA board. Bugs that appear in an early version of the BIOS may be corrected by the manufacturer in later versions.

Sometimes the ROM chip itself is labelled with the version number. (It is a 28-pin wide chip that is usually socketed instead of soldered to the board.) If the chip is not so labelled, you can usually check the BIOS version of an EGA board using DEBUG. Here's how to do it.

Install the EGA in a PC and boot

up. Load DEBUG and execute the following DEBUG command:

`D C000:0`

The manufacturer's copyright information, BIOS revision number, and possibly a date will usually appear at the right side of the screen. (Do not be shocked if you see the letters "IBM" in there also.) If you do not see anything that looks readable, the copyright notice may be located later in the BIOS. Enter D a few more times until it shows up. Leave DEBUG by entering Q.

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why some programs cannot run on the EGA. Understanding is of little comfort, however, if you or your company rely on one of those programs. To improve this situation,

several EGA manufacturers have attempted to implement CGA, MDA, and Hercules emulation together with EGA functions.

The products

The **IBM Enhanced Graphics Adapter** comes with an installation manual, an upgrade of the diagnostics disk, and replacement pages for your Guide to Operations manual. The basic board has just 64K of memory and a daughterboard, called the Graphics Memory Expansion Card, adds another 64K. The Graphics Memory Module Kit contains 128K worth of chips that plug into the Expansion Card. You need 128K of memory to get 16 colors from the high-resolution mode 16 and for using a 512-character set in text modes.

IBM's EGA is bulkier than its competitors, mostly because it uses 16K by 4-bit memory chips instead of

64K by 4-bit chips. A fully loaded 256K IBM EGA requires 32 memory chips while the other boards reviewed here provide the same memory with eight chips.

IBM's EGA includes a five-pin light-pen connector and a "feature connector" that permits access to many of the video and timing signals on the board. Two RCA jacks on the back of the board also connect to this feature connector but have no other function.

Technical documentation for the IBM board (which includes schematic diagrams and a complete commented listing of the ROM BIOS) is also available, if you know the secret of how to get it. Software support for the EGA is in the form of IBM's Graphics Development Toolkit, which contains Virtual Device Interface (VDI) files loaded as CONFIG.SYS drivers and bindings for IBM's BASIC, PASCAL, C, and FORTRAN compilers (but not for the BASIC interpreter.)

STB Systems' **EGA Plus** adds a parallel printer port to a CHIPSet-based EGA implementation. An optional clock/calendar is also available. Both the video connector and the printer connector are mounted on the board's rear bracket. Although most boards mount the DIP switch that controls the start-up video mode in the rear where you can access it from the back of your PC, STB puts it near the front of the board. (In most cases, however, you will not be changing the switch settings very often.)

Although the EGA Plus has a feature connector, it does not include the two RCA jacks on the IBM board. It is not yet clear whether this lack will be a problem. The RCA jacks on the IBM EGA are connected only to the feature connector, and any feature later installed may have its own jacks. If you need a printer port, the fact that it is mounted on the back of the board may be much more important to you than possible problems with "features" that do not yet exist.

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The EGA Plus comes with the same PC Accelerator software included with many of the company's other products. This disk, which includes RAMdisks, print buffers, and other utilities, has nothing to do with the EGA.

The **AST-3G Model 1** supports a parallel printer port available as an option. The back of the board contains the video connector, the RCA jacks, and access to the DIP switch. A cable with the printer connector attaches at one end to the board and either hangs out the back of your machine or mounts on a separate bracket in an adjoining slot in the machine.

AST Research includes an IBM-like diagnostics program (with a walk-through in the manual) and a demonstration disk by Zenographics. This program actually turns out to be an advertisement for other AST products, but it is very attractive.

Tecmar's **EGA Master** supports an optional serial port. While serial ports are most often used for modems (and some printers), the manual suggests using it for a mouse. This is an excellent idea and makes the Tecmar a good one-slot "Windows board."

Like the AST-3G, the Tecmar EGA Master has its video connector, RCA jacks, and DIP switches at the rear and runs a cable to another bracket for the serial port. Although the AST-3G and EGA Master both use a BIOS created by Inter-link Business Network, the boards are not the same.

The short list

The remaining EGA boards are on five-inch half-slot cards. In operation, the short cards tend to get hotter than full-length boards, but they are marvels to look at. (Quadram and Video-7 sell both long and short versions of their EGA boards.)

The Video-7 **VEGA** and Quadram **QuadEGA** + boards and manuals are identical except for the names. The manual is very good and covers both the short and long versions of these boards. A separate reference card summarises DIP switch settings. Emulation software for the CGA and

Hercules comes on a disk.

All the other boards imitate IBM by including a jumper to indicate if an Enhanced Color Display is attached to the EGA. The VEGA and QuadEGA+ boards instead have a toggle switch accessible from the back of the board. This switch will be a big help if you will be frequently switching the monitor on your EGA, but putting this function on a toggle switch is generally not a good idea. A toggle can be too easily switched from one position to another. Getting this switch wrong can cause problems with a monochrome display, such as smoke pouring out of your monitor.

The Video-7/Quadram short boards are the only ones that include a jumper for installation in slot 8 of a PC-XT.

Sigma Designs' **SigmaEGA!** comes with software to emulate the Hercules Graphics Card. The SigmaEGA! is a

little bulkier than the Video-7 VEGA and even uses a tiny daughterboard from the ROM BIOS. The ROM is soldered, but the daughterboard is removable. The boards come with software to switch to Hercules Graphics Card emulation. Sigma's board includes Z-Soft's PC Paintbrush program, which supports the EGA.

The Sigma manual says that PCs and XTs with system ROM dates of "10/27/82 or earlier" will need replacing. This is not true. The 10/27/82 PC ROM is fine; it is in fact the latest ROM available for the PC. If you wait for IBM to release a PC ROM with a date later than 10/27/82, you will be waiting a very long time.

The results

The EGA boards reviewed here worked well. I tested each on both an IBM Enhanced Color Display and an

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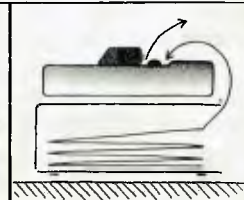
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IBM MDA with Microsoft Windows, 1-2-3, Release 1A (with the more recent EGA drivers), Microsoft Word, Version 2.0, and IBM's Virtual Device Interface (VDI) package. I also ran the boards through my own test program that checked BIOS functions and register compatibility. I looked at how the non-IBM boards dealt with some IBM BIOS bugs and quirks and with some of the more esoteric features of the EGA. This testing procedure was not an attempt to search out obscure features, but rather to determine if any of these boards will have problems with future software that takes full advantage of the IBM EGA. My findings fell under several main headings and figure 4 summarises the results.

☐ **Reboot on IBM PC.** Owners of PCs (but not XT's or AT's) will notice a big difference in how a Ctrl-Alt-Del command works after an IBM EGA has been installed. In short, the initialisation in the EGA BIOS destroys a register that the PC system board BIOS later uses to skip over the long memory checks during a three-key reboot. The EGA BIOS seems to be using this register to return an error code, yet the PC, XT, and AT do not check for this error code.

The AST-3G, STB EGA Plus, and Tecmar EGA Master are the only boards that do not change this register. PCs with these boards boot

up immediately after a Ctrl-Alt-Del. (A member of AST's technical staff told me that AST's BIOS changes the register only if an error occurs during the initialisation procedure. I suspect this is a good compromise.)

☐ **Teletype scroll calls.** On the DOS command level, and in most programs that use simple line-by-line output (such as DEBUG), DOS uses the BIOS teletype routine to display characters to the screen. This routine in the BIOS is responsible for moving the cursor, writing the character to the screen, and scrolling if necessary.

The speed of this teletype routine depends somewhat on the type of function calls the BIOS uses. To perform each teletype function, the BIOS in some boards uses additional Interrupt 10H function calls (I term these "re-entrant") and others use "internal" calls. BIOS routines that use internal calls generally have faster teletype response than those that use re-entrant calls.

STB engineers were well aware of the potential conflict with screen-recall programs and made an excellent compromise. STB's BIOS uses internal calls for everything except scrolling. This technique, plus some generally tight coding, allowed the EGA Plus to come near the top in these time tests.

I also tested the speed of each board when directly writing to display memory in text mode 3 and EGA graphics mode 16. For the EGA graphics modes, one routine wrote blocks to the screen (a memory-intensive operation) and another wrote lines to the screen (which involves frequent register manipulation). These three tests are not shown in the benchmark graphs because all the boards ran them at the same speed.

☐ **Number of characters in same font as IBM.** The IBM EGA's BIOS contains dot patterns for each available screen font. Most boards use IBM's fonts or something very close, except for the EGA Plus. In figure 4, the columns under the heading "No. of characters in same font as IBM"

compare each EGA font with IBM's.

The EGA BIOS includes a routine to load a user-defined font. This BIOS call also allows you to change the number of lines displayed on the screen. For instance, the normal text mode characters when the EGA is connected to an enhanced color or MDA have 14 scan lines. You can use the eight-scan-line character set to get 43 lines instead of 25.

☐ **Font-change problems.**

Unfortunately, the IBM BIOS has some bugs in the font-loading routines. One of these affects the underline attribute when you use the BIOS to change the font on the MDA. All the non-IBM EGA boards duplicate IBM's bug by making the underline disappear.

When an Enhanced Color Display is attached to the IBM EGA, this same BIOS call causes the cursor to disappear. All the other EGA boards do the same except the QuadEGA+ and the VEGA, which preserve the cursor if you are retaining 25-character lines on the screen. The problem with the IBM BIOS relates to a need for "cursor size emulation" on the Enhanced Color Display. Many programs assume that each character has eight scan lines when setting the shape and size of the cursor, so the IBM EGA BIOS has to adjust for the actual 14 scan lines. However, it makes this adjustment based not on the character font that is loaded but simply on whether an IBM Enhanced Color Display is attached. This problem is compounded during font loading.

☐ **Automatic font set on mode change.** The IBM EGA BIOS has a facility to automatically load a font during a video-mode change. The BIOS uses pointers set in lower memory to address this font. This is a nice feature, but it has not been well implemented. IBM's BIOS loads the font, but it does not correctly calculate the number of lines that appear on the screen, which causes problems with teletype output. The AST, STB, and Tecmar boards do not work at all with this facility.

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GRAPHICS

More Problems

Some EGA boards include a few of their own bugs as well as those duplicated (or expanded upon) from IBM's board.

EGA-standard boards are capable of using a 512-character set in test mode by storing two fonts of 256 characters each. The bit in the video attribute that normally defines high intensity is used instead for selecting between the two fonts; this has applications in bilingual word processors. All of the boards handled the 512-character set. Software may program the EGA board to generate the hardware interrupt IRQ2 (corresponding to Interrupt 0AH on the software level) at the beginning of a vertical retrace. In updates to the PC and XT Technical Reference manuals, IBM classifies IRQ2 as specifically the "EGA interrupt", although other hardware, like the Microsoft Mouse, uses it too. All the non-IBM EGA boards handled this interrupt well except for the QuadEGA+ and the VEGA, which generated the interrupt but reversed the bit in the status port. These two boards act in accordance with IBM's documentation, but not in accordance with IBM's (and everyone else's) implementation.

The QuadEGA+ and VEGA do some other strange things besides. If these BIOSs encounter a problem during booting, they will store an error code down in lower memory in a place reserved for the expansion memory size. On a PC (but not XT or AT), this code will cause your system to believe it has run out of memory prematurely, perhaps even before your CONFIG.SYS file gets done.

(Following my testing, Video-7 sent another VEGA board labelled Revision 3 with a BIOS version of 1.052 that corrected the vertical interrupt status bit, allowed a PC to boot up immediately after a Ctrl-Alt-Del, did not save an error code in the BIOS data area, and used re-entrant calls in the BIOS teletype routine. This latter change caused the new VEGA board to register the slowest

response in the teletype speed tests).

Most existing software written for the Color/Graphics Adaptor or the MDA will run well on the IBM EGA. Programs that directly manipulate some registers on the CGA or MDA board, however, will send the display into seizures. For this reason, several manufacturers have attempted to implement CGA, MDA, and Hercules emulation on their EGA cards.

The C&T Enhanced Graphics CHIPSet does not easily lend itself to this emulation. The registers that correspond to the 6845 registers are built into the CRT Controller chip, and nothing comparable to the CGA, MDA, and Hercules mode register and color register is present.

The boards that include emulation (SigmaEGA!, QuadEGA+, and VEGA) all use a software approach. The difference in results makes it clear that hardware emulation is superior.

The method used by VEGA and QuadEGA+ boards is characteristic of the software approach to emulation. Supplied with these boards is a RAM-resident program that you use to turn on or turn off CGA or Hercules emulation. This program manipulates a special register on the board to generate a "non-maskable interrupt" whenever the board receives a command from a program to load one of the CGA or Hercules registers that is either not duplicated on the EGA or that has a different meaning. (This non-maskable interrupt is normally used by the PC to catch memory errors and shut down your system with the infamous "Parity Check" message.)

When a program attempts to write to one of these registers, the resident software intercepts this nonmaskable interrupt. If the register is one of the 6845 registers that is not defined the same as the EGA registers with the same addresses, it will simply ignore it. If the register is the non-6845 mode control on the CGA or Hercules, it will initiate a mode change through normal BIOS logic.

Since this emulation technique requires the resident program, it



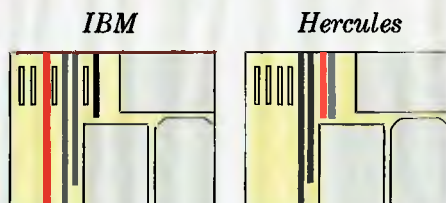
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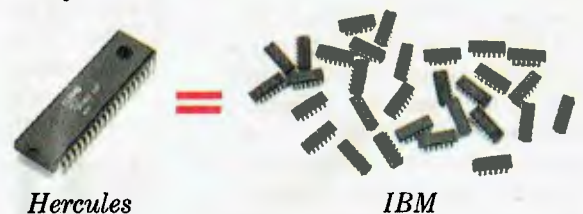


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cannot be used with software that must boot directly from a floppy disk. In addition, because it is a resident program, the emulation software may conflict with other programs. For instance, two of the debuggers I used (or tried to use) to understand the workings of this emulation technique were also using the nonmaskable interrupt as a hardware break. Every time I tried to load a CGA register, IBM's Professional Debug Facility told me that I should check my memory for parity errors.

If a CGA program attempts to legitimately manipulate a 6845 register not duplicated in the EGA, it will be ignored. If an EGA-aware program attempts to manipulate some of these overlapping registers in emulation mode, it will also be ignored.

The resultant emulation is nowhere close to 100 per cent register compatible, and it is not even BIOS compatible. For instance, on a CGA in graphics mode 6 (200 line by 640 dot two color), the following assembly language BIOS call will turn the foreground blue:

```
MOV BX,0001h
MOV Ah,0Bh
INT 10h
```

In CGA emulation mode, the QuadEGA+ and VEGA boards respond by making the background

blue, which is the same thing that happens on an EGA board in nonemulation mode. On the CGA board, you can create a blue foreground in high resolution by going directly to the CGA color register (using BASIC syntax):

OUT &H3D9,1

This is an output port not implemented on the EGA, and normally nothing happens. In CGA emulation mode on the QuadEGA+ and VEGA boards, nothing happens either. You can go through a year's worth of PC Australia's User-to-User columns and try out all the CGA special effects, but you will find that virtually none of them work in Video-7's and Quadram's CGA emulation mode.

Do not get the wrong impression, however: the CGA emulation mode

definitely will run some programs that cannot run on an EGA. Lotus 1-2-3, Release 1A, with the original CGA drivers, runs graphics with the CGA emulators, which is more than it does on a standard EGA. You will notice some speed degradation during display updates and some intermittent garbage on the screen when switching from graphics to text, but it works. (You can also get Lotus's EGA drivers for 1-2-3, Release 1A, which will work a lot better.) You can also run Flight Simulator if you execute it as a program instead of booting from the disk. The EGA cannot do these things, and Quadram's and Video-7's boards can. Just be aware of their limitations.

I am not picking on Quadram and Video-7; the SigmaEGA! board also has resident software that uses the same type of approach and only (at this time) implements Hercules

EGA Boards: available display modes

MONOCHROME DISPLAY

Mode	Type	Resolution	Lines x columns	Character box	Colors	Compatibility
7	Text	720x350	25x80	14x9	4	Monochrome adaptor
15	Graphics	640x350	25x80	14x8	4	

COLOR/GRAPHICS DISPLAY

Mode	Type	Resolution	Lines x columns	Character box	Colors	Compatibility
0&1	Text	320x200	25x40	8x8	16	Color/graphics
2&3	Text	640x200	25x80	8x8	16	Color/graphics
4&5	Graphics	320x200	25x40	8x8	4	Color/graphics
6	Graphics	640x200	25x80	8x8	2	Color/graphics
13	Graphics	320x200	25x40	8x8	16	
14	Graphics	640x200	25x80	8x8	16	

ENHANCED COLOR DISPLAY

Mode	Type	Resolution	Lines x columns	Character box	Colors	Compatibility
0&1	Text	320x350	25x40	14x8	16	Color/graphics
2&3	Text	640x350	25x80	14x8	16	Color/graphics
4&5	Graphics	320x200	25x40	8x8	4	Color/graphics
6	Graphics	640x200	25x80	8x8	2	Color/graphics
13	Graphics	320x200	25x40	8x8	16	
14	Graphics	640x200	25x80	8x8	16	
16	Graphics	640x350	25x80	14x8	4 (w/ 64K) 16 (w/ 128K)	

Figure 1: The EGA video modes available to you and how they will look on the screen depend mostly upon the type of display used.



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Graphics Card emulation.

Under Hercules emulation, the SigmaEGA! QuadEGA+, and VEGA boards all ran 1-2-3 with the Hercules drivers, Microsoft Windows installed for a Hercules card, and HBASIC. But if you try running Microsoft Word, Version 2.0, with the /H option (which will give you 43 lines on a Hercules card), Word will not recognise the board as a Hercules and will instead use 25 lines in EGA monochrome mode 15. (The new Version 3 of Word will give you 43 lines on an EGA, too.)

My experience with these software

emulation techniques led me to admire the attitudes of some companies (like Tecmar) that told me outright they do not think that emulation is an important issue and they have no plans to implement something similar.

The future

The CGA and Hercules emulation issue will refuse to die for a while longer, I suspect. Surely there is no real harm in emulation if it does not degrade overall performance, and it would be nice to have one adaptor that can really mimic the operation of several different adaptors. One obvious approach is to put both a C&T Enhanced Graphics CHIPSet and a 6845 on one board. Such a board will probably be available by the time you read this.

The EGA is not the last word in video adaptors, but right now, with thanks due in large part to C&T for doing the dirty work, the EGA is the only video adaptor that can serve as a modestly priced near-universal replacement for the old Monochrome and Color/ Graphics Adaptors and even (sorry, Hercules) the Hercules Graphics Card. ■

Charles Petzold is a contributing editor of US PC Magazine.

Late arrivals

Some of the more recent EGA compatibles, announced too late to make this benchtest review, included the Paradise AutoSwitch EGA, the Orchid Technology TurboEGA and the Australian-made Hypervid board from Hypertec. Each of these adds extra functionality to the 'plain vanilla' EGA board as reviewed in the main article.

The AutoStart EGA from Paradise Systems Inc. features automatic switching between display modes, as opposed to the software drivers used by most other boards. The half-size card also boasts another improvement over the other boards using multi-chip gate array sets, in that Paradise has shrunk all of this technology onto a single chip. This chip is being made available on an OEM basis to manufacturers wishing to install EGA capability at the motherboard level, but not to manufacturers of expansion boards (for fear of competition).

The Orchid TurboEGA takes a different approach and combines an 80286 accelerator board with the C&T EGA chip set. This makes a lot of sense for applications such as

EGA Boards: summary of features

Product manufacturer	Chip count	Graphics chip	Emulation		Color/graphics claimed	actual	Monochrome adaptor		Hercules graphics claimed	actual	Technical reference available	BIOS copyright	BIOS version (or date) tested	Software	Card length
			Color/graphics	Monochrome			Monochrome	Hercules							
EGA Master Tecmar	38	C&T	No	—	No	—	No	—	No	—	No	Interlink Business Network	1.21	None	Full
EGA Plus STB Systems	40	C&T	No	—	No	—	No	—	No	—	Planned	STB and Award Software	1.07	PC Accelerator utilities	Full
AST-3G Model 141 AST Research	141	C&T	No	—	No	—	No	—	No	—	Planned	Interlink Business Network	1.19	Diagnostics demo	Full
QuadEGA+ Quadram Co.	28	C&T	Yes	Adequate	No	—	Yes	Adequate	No	—	No	Video-7	1.03 (29/1/86)	Emulation, diagnostics	Half or full
SigmaEGA! Sigma Designs	30	C&T	No	—	No	—	Yes	Adequate	Planned	Sigma Designs	1.06	Emulation PC Paintbrush	1.06	Emulation, diagnostics	Half
VEGA Video-7	28	C&T	Yes	Adequate	No	—	Yes	Adequate	Planned	Video-7	1.04B (19/3/86)	Emulation, diagnostics	1.04B (19/3/86)	Emulation, diagnostics	Half or full
IBM EGA IBM Corp.	75	Others	No	—	No	—	No	—	No	—	Yes	IBM	13/9/84	Diagnostics	Full

Figure 3.

Microsoft Windows (which happens to be bundled with the board), which require both EGA graphics and increased speed to be used effectively.

Finally, the latest entrant into this fiercely competitive market niche is the Hypertec Hypervid board, which combines the C&T chip set with a multifunction board, incorporating 512K (in addition to the 256K video RAM), a battery-backed clock/calendar and a serial and parallel port, for a recommended retail price of \$1450. No doubt, further developments in gate array technology will result in even greater functionality built into both expansion cards and PC motherboards.

Ian Robinson

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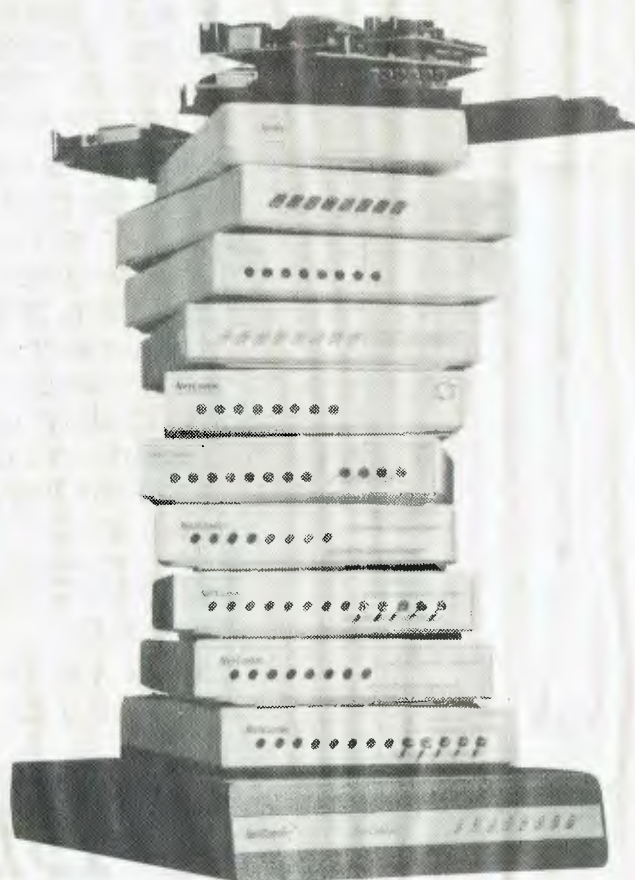
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A new dimension in graphics

It is hard for three dimensional beings to visualise a fourth dimension but Phil Grouse shows that a PC can be programmed to display it

More than a century has elapsed since Edwin Abbott's science fiction satire "Flatland" first appeared in print. It has endured to enchant and entertain generations of readers with its combination of humor, simplicity and speculations about complex mathematical concepts.

Abbott, an English professor whose hobby was mathematics, conceived a two-dimensional universe inhabited by lines, triangles, squares and circles. In this flat world the "third dimension" was unthinkable. The story tells of its hero's vain attempts to explain to his peers the possibilities of one more dimension, a dimension that is part of our everyday experience. Imprisoned as a heretic, he laments the results of his insights and the use of words like "up", "down" and "high".

Science fiction buffs who "believe" in the fourth dimension are treated

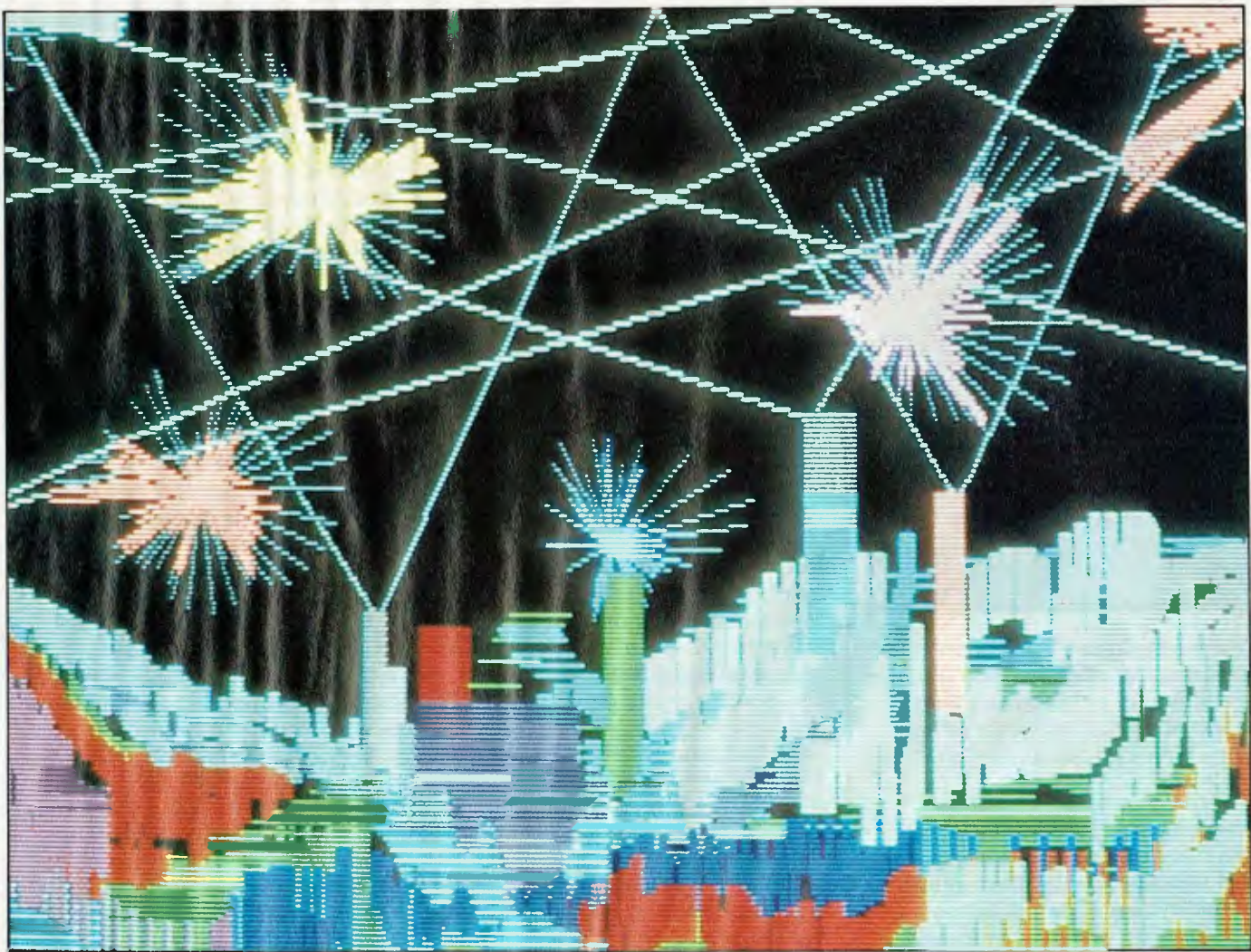
with better respect today. We are accustomed to the "warp drive" of Star Trek, and the beautiful notions behind Dr Who's Tardis — a time machine that is bigger inside than outside. Students of mathematics write essays on the geometry of higher dimensions, and astronomers fully accept the physical implications of "curved space".

But there still remains the conceptual problem. How can three-dimensional beings, you and I, visualise an object with more than three dimensions? Where is the equivalent of "up" in a four-dimensional direction? If Abbott's hero were able to point his arm in the direction of the third dimension, that arm would have vanished from observation in his flat space — it would have been at right angles to his universe. Similarly, if one could point a rod into the fourth dimension, it

might also disappear from view — being at "right angles" to our own familiar space.

Nevertheless there is a strong mathematical foundation for hyper-dimensional spaces, and indeed physics recognises that space itself has the characteristics of no less than 11 dimensions. A recent science show produced in the US featured the work of a physics professor who had devised a computer graphics program that would display two-dimensional projections of four-dimensional objects. The objects chosen ranged from simple wire-frame figures (such as the hyper-cube or hyper-pyramid) to more complex objects representing the components of "twister space".

Surprisingly, such a program is not all that difficult to write — if one has a basic understanding of matrix algebra and the patience and care necessary to come up with a correct



solution. I was quite surprised to see the program in operation since it was an exercise that I had tackled many years earlier in BASIC for an 8-bit Intercolor graphics computer. Naturally the earlier program performed much slower than the TV version, which had the advantages of high-speed high-resolution color graphics. Nevertheless, it rekindled my enthusiasm for this particular piece of programming trivia, so I decided to try it once again, this time for the IBM PC with a color graphics adaptor.

Turbo Twisting

Until recently my contact with Pascal was minimal. It has been fashionable to regard Pascal as a children's edition of PL/I — that was until Borland International produced Turbo Pascal. Before that, Pascal mostly languished in the halls of

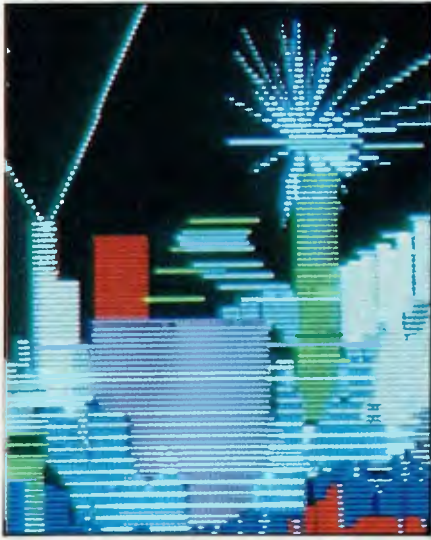
academia as a tool for the teaching of structured programming. "Real" programmers scorned it. Mind you, Turbo Pascal is quite an unusual dialect of the original language, and a vast improvement on it. The objection that it differs from standard Pascal is diminished because of its immense and growing following. Bowing to the pressures of curiosity and low price I finally bought Turbo Pascal and did a pressure-cooker course in the language by reading "Frank" Borland's excellent documentation. I also had a vested interest in it since I wanted to develop a Pascal translator for my own Stylus program editor system.

But be warned — the programs written using the bells and whistles of Turbo Pascal are not particularly portable. If you are considering writing an application that has a wider

market potential than the IBM PC/XT/AT clan and its camp followers, it seems that a language like C will be the prudent medium.

Listing 1 shows my third Pascal program. Admittedly it was developed with Stylus, but I still feel sufficiently pleased with it to share it with PC Australia readers. No doubt the Pascal experts will want to polish it up a bit, but the mathematical core is there, as is the display component. Furthermore, I have double-checked the validity of the rotation matrix Rot by computing its determinant for a wide variety of cases to prove its singularity.

Pascal's requirement that the functional code for a program or procedure is placed at the end of the module is a trifle disconcerting. For example, the "mainline" for this program is right at the end as a BEGIN-END block. In other words,



Pascal introduces all the players (the constants and identifiers) and then the definitions for all the participating action before telling you the actual story. Not really top-down stuff, Dr Wirth!

Here, in principle, is what the program does. We begin by setting two flags, **continue** and **same**, to **true** and **false** respectively. The continued overall cycling of the program is controlled by **continue**, while **same** is used within the main loop to specify whether to display the same object but with different rotational parameters. The main loop is therefore a **WHILE** block controlled by **continue**. On first entering this block, **same** will be **false**, forcing the specification of a new object. This is the function of the procedure **AcceptObject**, which permits the entry of the object's shape either via the keyboard or through a stored data file. (Whenever an object is specified through the keyboard it is also saved as a named data file for later use. The contents of the file **TESS** [specifying our four-dimensional cube] are given in listing 2.)

After the object's shape has been specified, **AcceptRotation** asks for six small angles. These will be used to rotate the object about its six axes of rotation between each frame in the display. Six, you cry? Are there not just four dimension and therefore four axes of rotation? Alas, things get a

little complex in 4-D land.

Think for a moment how two-dimensional objects rotate. A circle rotates about a point at its centre. A three-dimensional object rotates about a line axis. By analogy, four-dimensional objects rotate about a plane. There are six such planes — one containing the X and Y axis, another with the Z and W axis, and so on.

The next operation is performed by **ComputeMatrix**. This is the nasty one. The six angles set by **AcceptRotation** are massaged into a four-by-four rotation matrix called **Rot**. The function of **Rot** is to transform each point in the object into its new position for the next frame.

The process is one of matrix multiplication for each point. If you feel energetic, you can prove that **Rot** is correct by multiplying the six individual plane rotation matrices. The technique is described in an article by A.K. Dewdney in the Computer Recreations section of the April, 1986, edition of *Scientific American* (which also has some rather nice photographs of projections of a hyper-sphere as shown in the aforementioned television show).

The procedure **DisplayObject** is your "movie projector". It recomputes the new co-ordinates for the object and then displays it on your screen. A pause is necessary to let you see the frame before the next frame is drawn. You can speed up the rate by reducing the delay value. Unfortunately you cannot do much about speeding up the rate at which the PC draws individual lines.

Even my 8087 numeric coprocessor does not help much. Perhaps a reader may know of some PC line-drawing graphics routines that know when the 8087 is installed. Do pass it on if this is the case, but only if there is a real speed advantage.

You can sit and watch your object spinning weirdly until you press a key. This will terminate **DisplayObject** and ask you if you want to view a different object. The flag **same** is set according to your reply, and is used at the start of the main **WHILE** block. If **same** is

set, then clearly you want to **continue**. Otherwise the program asks, "Do you wish to continue?" The result is set into the flag **continue** which then controls the cycling of the main **WHILE** loop. That is it.

Finally, a word about the structure of data files. These are in ASCII format and are in two sections. Section one defines the number of points and their co-ordinates, section two defines the number of interconnecting lines and their colors.

For example, listing 2 defines a hyper-cube in the following way. Line one specifies the number of points (vertices) in the object. A hyper-cube has 16 vertices. In general, an n-dimensional cube has 2^n vertices. Thus a two-dimensional cube (a square) has four vertices, a normal cube has eight, and so on. You can see the 16 points listed in the lines following the point-count. This hyper-cube has a side of 100, and the points represent all possible combinations of signed values of magnitude 50. It helps to think of a hyper-cube as two ordinary cubes separated (four-dimensionally) by the length of a side. Each of the eight pairs of corresponding vertices are then joined by a line. The first set of eight four-dimensional points define one of the cubes (its fourth dimension is -50). The second cube has a fourth dimension of +50 (the last column of the four).

The second section of a data file begins with a line with a single integer (the number of interconnecting lines). For our hyper-cube each of the two (ordinary) cubes has 12 lines giving a total of 24 lines. The lines linking the pairs of vertices add another eight, giving a total of 32 lines in all. In the lines following the linecount, the first 12 define the lines of the first cube (color 1), the last 12 define the lines of the second cube (color 3), and the intervening eight lines are the vertex connectors (color 2). Each line definition refers to the number of the line in section one. Hence the first line specification (1 2 1) means that points one and two are lined by a line of color 1. Point one is -50, 50, -50, -50.

Listing 2. Data file TESS specifying a hyper-cube of side 100.

16				8	5	1
-50	50	-50	-50	1	5	1
50	50	-50	-50	2	6	1
50	-50	-50	-50	3	7	1
-50	-50	-50	-50	4	8	1
-50	50	50	-50	1	9	2
50	50	50	-50	2	10	2
50	-50	50	-50	3	11	2
-50	-50	50	-50	4	12	2
-50	50	-50	50	5	13	2
50	50	-50	50	6	14	2
50	-50	-50	50	7	15	2
-50	-50	-50	50	8	16	2
-50	50	50	50	9	10	3
50	50	50	50	10	11	3
50	-50	50	50	11	12	3
-50	-50	50	50	12	9	3
32				13	14	3
1	2	1		14	15	3
2	3	1		15	16	3
3	4	1		16	13	3
4	1	1		9	13	3
5	6	1		10	14	3
6	7	1		11	15	3
7	8	1		12	16	3

You can invent objects of all shapes and sizes. Just be careful not to make them too big or strange things may happen. How about trying your hand at designing a four-dimensional equilateral pyramid, or a hyper-sphere with latitude bands (actually toroids)? For the adventurous, how about a program modification that presents two images of the object side-by-side for stereo viewing? You could use an old fashioned stereo viewer to see the thing as a three dimensional projection; far more fascinating. But beware — too much of this sort of thing and you may wind up disappearing from reality. After all, there is no such thing as the fourth dimension, is there?

Phil Grouse, a PC fanatic from way back, was Professor of Computer Science at UNSW and now runs his own software company.



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NEW DIMENSION

Listing 1. Turbo Pascal program for four-dimensional "movies".

```

program FourDimensions(input,output);
{ This Turbo Pascal program displays the moving two-dimensional }
{ shadow of a four-dimensional wire figure. You can enter an }
{ object through the keyboard and save it in a file for later }
{ recovery. You specify the points in the object, the lines to }
{ be connected, and their colours (1, 2 or 3). You must also }
{ provide the (small) angles to rotate the body between frames. }
const
  MAXPOINTS = 50; {Max no of points in object}
  MAXLINES = 50; {Max number of lines in object}
  g = 0.0174533; {degrees to radians}
var
  object: array[1..MAXPOINTS,1..4] of real;
  lines: array[1..MAXLINES,1..3] of integer;
  PointCount: integer; { Points in the object }
  LineCount: integer; {Lines in the object}
  continue: boolean;
  same: boolean;
  answer: char;
  Rot: array[1..4,1..4] of real;
  a,b,c,d,e,f: real; {angles of rotation}
  InF,OutF: text;

procedure AcceptObject;
{ Lets user supply point an line data for new object }
{ This procedure allows object-input from keyboard or text file }
var
  answer: char;

procedure ReadFile;
{ Read nominated file into object and lines }
{ Read object data from a text file }
var
  i: integer;
  FileName: string[30];

begin {ReadFile}
  write('Name of input file? '); readln(FileName);
  Assign(InF,FileName); Reset(InF);
  readln(InF,PointCount);
  for i:=1 to PointCount do
    readln(InF,object[i,1],object[i,2],object[i,3],object[i,4]);
  readln(InF,LineCount);
  for i:=1 to LineCount do
    readln(InF,lines[i,1],lines[i,2],lines[i,3]);
  close(InF)
end {ReadFile};

procedure GetNewObject;
{ User supplies a new object from kbd }
{ Read object from keyboard and save it in a text file for later }
var
  FileName: string[30];
  i: integer;

```

```

begin {GetNewObject}
  write('How many points in this object? ');
  readln(PointCount);
  while PointCount > MAXPOINTS do
    begin
      writeln('Max number of points is ',MAXPOINTS);
      write('How many points? ');
      readln(PointCount)
    end;
  writeln;
  writeln('Supply the four (real) coordinates for each point ... ');
  for i:=1 to PointCount do
    begin
      writeln; write(' Point #',i,'? ');
      readln(object[i,1],object[i,2],object[i,3],object[i,4])
    end;
  writeln; write('How many lines in the object? '); readln(LineCount);
  writeln('For each line, supply the two endpoints and its colour 0..3:');
  for i:=1 to LineCount do
    begin
      writeln; write(' Line #',i,'? ');
      readln(lines[i,1],lines[i,2],lines[i,3])
    end;
  write('Name of text file in which to store object? ');
  readln(FileName);
  Assign(OutF,FileName); Rewrite(OutF);
  Writeln(OutF,PointCount:4);
  for i:= 1 to PointCount do
    writeln(OutF,object[i,1],object[i,2],object[i,3],object[i,4]);
  Writeln(OutF,LineCount:4);
  for i:=1 to LineCount do
    writeln(OutF,lines[i,1]:5,lines[i,2]:5,lines[i,3]:5);
  close(OutF)
end {GetNewObject};

begin {AcceptObject}
  ClrScr; LowVideo;
  write('Do you want to read in an object from a file? '); read(Kbd,answer);
  writeln;
  If UpCase(answer) = 'Y' then
    { Get data from text file }
    ReadFile
  else
    { Get data from keyboard and save }
    GetNewObject
end {AcceptObject};

procedure AcceptRotation;
{User specifies the angular rotations}

begin {AcceptRotation}
  ClrScr;
  writeln('Next, please specify the six angles of rotation (degrees) ..');
  writeln;
  write('About plane containing Z and W? '); readln(a); a:=a*g;
  write('About plane containing X and W? '); readln(b); b:=b*g;
  write('About plane containing X and Y? '); readln(c); c:=c*g;
  write('About plane containing X and Z? '); readln(d); d:=d*g;

```



```

write('About plane containing Y and Z? '); readln(e); e:=e*g;
write('About plane containing Y and W? '); readln(f); f:=f*g

```

```
end {AcceptRotation};
```

```
procedure ComputeMatrix;
```

```

{ This is the nasty part of the program. It sets the elements of the
{ 4x4 rotation matrix from the six rotation angles a..f. The resulting
{ matrix is singular (its determinant is 1). }

```

```
var
```

```
sa,ca,sb,cb,sc,cc,sd,cd,se,ce,cf:=real;
```

```
i,j: integer;
```

```
begin {ComputeMatrix}
```

```
sa:=sin(a); ca:=cos(a); sb:=sin(b); cb:=cos(b);
```

```
sc:=sin(c); cc:=cos(c); sd:=sin(d); cd:=cos(d);
```

```
se:=sin(e); ce:=cos(e); sf:=sin(f); cf:=cos(f);
```

```
Rot[1,1] := ca*ce*cf + sa*cb*sd*se*cf - sa*sb*sc*cd*se*cf + sa*sb*cc*sf;
```

```
Rot[1,2] := sa*ce*cf - ca*cb*sd*se*cf + ca*sb*sc*cd*se*cf - ca*sb*cc*sf;
```

```
Rot[1,3] := cb*cc*sf - cb*sc*cd*se*cf - sb*sd*se*cf;
```

```
Rot[1,4] := cc*cd*se*cf + sc*sf;
```

```
Rot[2,1] := -sa*cb*cd - sa*sb*sc*sd;
```

```
Rot[2,2] := ca*cb*cd + ca*sb*sc*sd;
```

```
Rot[2,3] := sb*cd - cb*sc*sd;
```

```
Rot[2,4] := cc*sd;
```

```
Rot[3,1] := -ca*ce*sf - sa*cb*sd*se*sf + sa*sb*sc*cd*se*sf + sa*sb*cc*cf;
```

```
Rot[3,2] := -ca*sb*sc*cd*se*sf + ca*cb*sd*se*sf - ca*sb*cc*cf - sa*ce*sf;
```

```
Rot[3,3] := sb*sd*se*sf + cb*sc*cd*se*sf + cb*cc*cf;
```

```
Rot[3,4] := -cc*cd*se*sf + sc*cf;
```

```
Rot[4,1] := sa*cb*sd*ce - sa*sb*sc*cd*ce - ca*se;
```

```
Rot[4,2] := -ca*cb*sd*ce + ca*sb*sc*cd*ce - sa*se;
```

```
Rot[4,3] := -sb*sd*ce - cb*sc*cd*ce;
```

```
Rot[4,4] := cc*cd*ce
```

```
end {ComputeMatrix};
```

```
procedure DisplayObject;
```

```
{ Show moving object, rotating it }
```

```
{ between frames, until key pressed }
```

```
var
```

```
i: integer;
```

```
procedure RotateObject;
```

```
{ Rotate the object by multiplying it with the rotation matrix Rot }
```

```
var
```

```
i,j,k: integer;
```

```
t: array[1..4] of real;
```

```
begin {RotateObject}
```

```
for i:=1 to PointCount {each point} do
```

```
begin
```

```
{ Set temporary vector t to all zeros }
```

```
FillChar(t,SizeOf(t),0);
```

```
for j:=1 to 4 do
```

```
for k:= 1 to 4 do
```

```
t[j] := t[j] + Rot[j,k]*object[i,k];
```

```
for j:= 1 to 4 do
```

```
object[i,j] := t[j]
```

```
end
```

```
end {RotateObject};
```

```
procedure ShowObject;
```

```
{ Display and wait }
```

```
{ Display the lines in the object in }
```

```
{ low resolution colour graphics. }
```

```
var
```

```
i: integer;
```

```
begin {ShowObject}
```

```
GraphColorMode; Palette(2);
```

```
for i:=1 to LineCount do
```

```
begin
```

```
Draw(round(object[lines[i,1],1])+160,
```

```
round(object[lines[i,1],2])+100,
```

```
round(object[lines[i,2],1])+160,
```

```
round(object[lines[i,2],2])+100,
```

```
round(lines[i,3]))
```

```
end;
```

```
{ Pause to display current frame }
```

```
delay(200)
```

```
end {ShowObject};
```

```
begin {DisplayObject}
```

```
GraphColorMode;
```

```
Palette(2);
```

```
{320 by 200 colours green, red,yel }
```

```
repeat
```

```
RotateObject;
```

```
ShowObject
```

```
until KeyPressed;
```

```
TextMode(2)
```

```
end {DisplayObject};
```

```
begin {FourDimensions}
```

```
{ main program }
```

```
continue := true; same := false;
```

```
while continue do
```

```
begin
```

```
If not same then
```

```
AcceptObject {new set of points and lines};
```

```
AcceptRotation; { determine rates of rotation }
```

```
ComputeMatrix; { develop 4x4 rotation matrix }
```

```
DisplayObject; { Show the rotating 2D projection }
```

```
write('Continue with same object? '); read(Kbd,answer);
```

```
writeln;
```

```
same := UpCase(answer)='Y';
```

```
If not same then
```

```
begin
```

```
write('Do you wish to continue? ');
```

```
read(Kbd,answer); continue := UpCase(answer)='Y'
```

```
end
```

```
end
```

```
end {FourDimensions}.
```


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QUBIE

Enhancing your keyboard

No matter how fast your PC, entering repetitive information is a chore. Murray Frazer looks at two word processors which make things easier for beginners and faster for experts

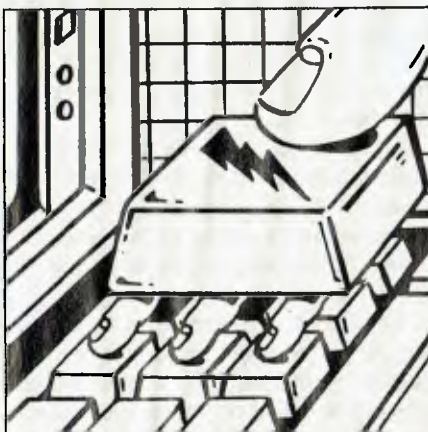
Among the jargon that bedevils the world of personal computers is the term "macro". I had wondered for some time what it meant and when I eventually found out, I realised that I had been using macros for some time. One way of generating macros is through the use of a "keyboard enhancer"; more jargon, but this time a little more descriptive.

A macro is a command that is itself a series of commands or a section of text. If, by striking one or two keys you generate a command or text sequence of more than one or two characters, then you are using one.

Macros and keyboard enhancers were developed with two kinds of major use in mind. First, programs like WordStar use the control key and commands that are not particularly easy to remember. You can, however, use an enhancer to generate macros that redefine keys to make the commands easier to remember. The second use was for sections of text that are frequently used unchanged, such as a name, position and address at the end of a letter. Instead of perhaps 40 or 50 keystrokes, just one or two can do it all. I want to illustrate how an enhancer can make life easier for the computer beginner, quicker for the more expert user, and how to make sophisticated routine functions accessible to people with little background in computers. I will use Smartkey and the Perfect series of software but the same principles apply to other enhancers and software.

More recent word processors than WordStar, such as Perfect Writer,

have commands that are more mnemonic and so much easier to remember but they tend in consequence to be much longer.



Perfect Writer for instance requires the command `@style (leftmargin 20 chars)` — say 29 keystrokes — to change a left margin to 20 characters in width. While descriptive and easy to remember it is cumbersome and slow.

Smartkey — a new version, Smartkey 5.0, was released in 1985 — is a brilliant program, easy to learn and use, and extremely powerful. Combining it with a program such as Perfect Writer and its associated spreadsheet Perfect Calc and database Perfect Filer, produces a very powerful result. Smartkey allows you to redefine any single key to represent any sequence of keystrokes but it is clearly not much use to redefine most single keys because you may need the original value of the key. So Smartkey lets you define any key as a supershift-key; an extra shift-key. If for

example you define the alt-key as the super-shift key, it is easy then to redefine `[alt] L` to represent the 29-stroke command above for changing the left margin to 20 characters. You might similarly define `[alt] R` to change the right margin to 20.

You should then also redefine key settings to change the margins back. While this is an improvement, you are in trouble if you want margins of 15 or 25.

Smartkey has interactive key settings which can be used to set up a margin command. Suppose my margins are set at 10 and I wish to change the left to 20 while leaving the right unchanged I type `[alt] M` and on the screen appears:

```
@style(leftmargin 10^
where^ represents a blinking box
cursor. If I want to retain a left
margin of 10, I hit the [enter] key. To
get 20, I backspace twice to erase the
10 and then type 20 followed by
[enter] and the screen changes to:
```

```
@style(leftmargin 20 chars,
rightmargin 10^
```

This has changed the left margin to 20 characters, and I hit `[enter]` again to confirm the right margin at 10, getting on screen:

```
@style(leftmargin 20 chars,
rightmargin 10 chars)
```

Through just seven keystrokes I have obtained what normally needs about 30. With only three more strokes I can change the right margin as well, whereas without Smartkey it needs another 25. Changing the left margin back to 10 is even easier: `[alt] M` to call up the Perfect Writer style

command as above and [enter] twice to accept 10 chars for each margin. four strokes.

This form of simplification of commands can be carried further. In Perfect Writer there are several formatting commands that you might wish to vary fairly often from the default options. Using Smartkey, these can easily be grouped into a format block. I set up the command [alt] F for this, and it shows up as: @style(Bottommargin 1^

If this is the margin I want at the bottom of the page [enter] confirms it and moves on to the next format option. If a change is wanted, it is executed as before. The same sequence continues through the following seven formatting options.

@Style(Bottommargin	1 line,
Topmargin	3 lines,
Leftmargin	10 chars,
Rightmargin	10 chars,
Indent	0 chars,
Spacing	1 line,
Spread	1 line)

Another use for macros is to automate a long sequence of commands (complex or simple) that need to be entered over some time. For example, I use the Perfect Calc spreadsheet for finance and staff planning and recording. I have a series of 10 spreadsheets that cross-reference one another and at each update I need all 10 in memory at once. As each takes several minutes to load from disk, it is very annoying to have to return to the machine every few minutes to check whether one sheet has finished loading so I can enter the commands to read the next from disk.

Instead, I have set up one command, [alt] I, with more than 140 keystrokes in it (102 of these being the

names of the 10 files). From my two keystrokes Smartkey sends to Perfect Calc the program in the box below.

Similarly when it is time to save all these files, [alt] 2 sends a long string of instructions to Perfect Calc that saves all 10 files, both in spreadsheet form for the next update and in formatted version ready for printing with Perfect Writer.

The third use of macros concerns a series of moderately complex instructions you want for people who have little experience of personal computers. For example, we use Perfect Filer, a non-relational database or electronic filing system. One monthly task is to accept telephone bookings for a function and to print out an alphabetical list of all those who have booked and a list in order of booking to assist in checking who has or has not yet paid.

Perfect Filer is excellent for these tasks but because it is a fairly versatile system with many options, inexperienced users can have some difficulty in correctly following the correct sequence of commands.

By setting-up Smartkey macros, inexperienced users can add more names to the database, sort the names into alphabetical order and generate the required listing, and then print the list with formatting commands through Perfect Writer with only a few keystrokes. For example, to sort the names and generate the list we use [alt] S to get:

```
s [enter] [enter] a 1[escape] a g
forumlst.mss[enter] y 60[enter]
[enter]
[enter] s forumlst.out[enter]
```

This formidable list of commands takes one unerringly through the many options available within Perfect Filer to the stage of being ready to print the now sorted and formatted list. To print, type [alt] P to get:

```
[Sh F10] ucsuper-11-12p[enter] s
```

This will print the formatted list with Perfect Writer, at 12 pitch rather than the default setting of 10 on the printer we use.

The blank spaces in some of these macros appear to be necessary to stop the Perfect Software programs from getting a little confused at the rush of commands the Smartkey macros send. I have so far discovered no cases when this confusion cannot be fairly readily overcome, usually by inserting a few blanks as shown. Also, all the Perfect programs have excellent pop-up menus to guide the user.

Smartkey has many outstanding features. One makes generating some of the complex macros illustrated above easy. Whenever Smartkey is loaded your last 64 keystrokes are kept in a buffer, so if you suddenly realise that a lengthy series of strokes you have just finished will be valuable as a macro, it is there already, stored in the buffer!

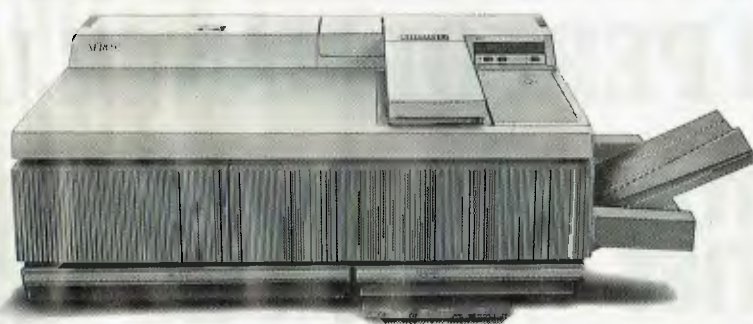
Another feature is a "look" command, which enables you to see what your new macro will look like when the work processor gets hold of it. Smartkey is quite easy to learn and to use: It is driven through the now almost standard bar menu arrangement, with selection made by moving a cursor over the item name and hitting [enter] or by typing the first letter of the item.

Two other great advantages of this keyboard enhancer, or macro generator, are that it is comparatively cheap and that it is produced in Australia so assistance or advice is a phone call away. Compatibility problems between Smartkey and your software (apart from a few programs which bypass the usual "keyboard interrupt" and go directly to the processor to gain speed) may be fairly easy to solve. At a recommended retail price of \$77, Smartkey is by far the cheapest of the keyboard enhancers. ■

*Murray Frazer is director —
Technology and Innovation at
Victoria's Department of Industry,
Technology and Resources.*

```
[^D]rheadgfin.pc[enter][^D]rstaffin.pc[enter]
[^D]rentfin.pc[enter][^D]rinfin.pc[enter]
[^D]rdevtfin.pc[enter][^D]rpolifin.pc[enter]
[^D]rreacfin.pc[enter][^D]radmnfin.pc[enter]
[^D]rcommfin.pc[enter][^D]rsummafin.pc[enter]
```


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Pushing aside daisies

Bell and Howell says it will market the new K8 laser printer, from QMS Inc of the US, which was designed as a replacement for the daisy wheel printer.

It emulates popular impact printers such as the Epson FX80, the Diablo 630 and the QUME Sprint and is based on the Canon electro-photographic "engine". The K8 features 90,000 dots per inch resolution, eight resident fonts and a duty cycle of up to 5000 pages a month. It can print eight pages a minute.

Standard with 78K of user accessible memory, the K8 enables the user to mix graphics and text on one page and to select between portrait and land-

scape orientation. A PC-compatible Centronics parallel interface is standard and an RS232C interface is optional.

The paper handling capabilities include a standard 100 page input cassette and a 25 page output tray. An optional dual bin sheet plus envelope feeder can be fitted to increase the system's capacity to 450 sheets.

Other K8 options include starter kits, menu driven configuration programs and an on-screen training guide.

*Bell and Howell
9 Short Street
Chatswood NSW 2067
(02) 406 5966*



The QMS K8 laser printer: it can mix graphics and text on one page and choose between portrait and landscape orientation

Keeping users in touch

Sourceware has launched a special networking version of its SMART integrated software system to boost the communications and resource sharing capabilities of IBM PC workstations.

The SMART network allows multiple users to increase office productivity by cost effectively sharing disk files and data. Developed by US company Innovative Software, the network runs on a wide range of IBM PC and compatible local area networks (LANs).

Sourceware claims it was developed to spur a lagging network market, plagued with problems ranging from data transfer between stand-alone packages to diskless data managers for integrated packages. It believes the

problems with previous integrated networks stem from the use of RAM-based data managers instead of disk-based managers.

The network package includes a word processor with spelling check, data manager, spreadsheet with graphics, and the system disk. All modules have communications functions and can accommodate three workstations. Additional user access nodes can be purchased.

The software controls the number of simultaneous users. The SMART network is compatible with all DOS 3.10 compatible network operating systems.

SMART networking version \$1999.

*Sourceware
586 Pacific Highway
Chatswood NSW 2067
(02) 411 5711*

AVMAC macro-assemblers for PCs

Avocet Systems has announced the availability of the AVMAC range of cross-assemblers for PC operations. AVMAC allows faster project completion by eliminating delays caused by waiting for access to specialised computer hardware or learning new commands.

It can run with existing operating systems and text editors. If a new microprocessor is specified, all that is required is another assembler, not a whole new development system. AVMAC's powerful micro facility offers familiar architecture augmented with modern structured control statements.

The advanced object format (AOF) supports complex relocatable expressions, user defined segments and segment classes, with control of combination alignment, containment and

other attributes.

Extensive command-line options provide full control over assembler operation. Informative error messages and cross reference reports make debugging and documentation easy. It supports chip families with address space and instruction validation. The common underlying syntax makes it easy to switch from one AVMAC target to another.

Version-specific enhancements provide compatibility with chip manufacturers' assembly languages. The package includes the AVMAC assembler and macro processor, an AVLINK linker, the AVLIB librarian, AVREF report generator and several utility programs.

*Avocet Systems
P.O. Box 1066
North Fitzroy Vic 3068
(03) 481 0155*

Author, author

Author is an authoring system for the IBM PC, XT, AT, JX and compatibles and is used extensively within educational, government and business environments for a wide range of training applications.

Version 8 features real animation, control and playback of other software packages within an Author lesson, additional question types and presentation styles, a variety of special effects for screen changes, and keystroke recording and playback. It supports mouse menus, the IBM enhanced graphics adaptor (EGA), DOS access and DOS 3.1 networking.

Graphics screens are created with GED, Author's graphic design option. Slide reproduction is possible. Sixteen color graphics are available using Author 8



An image generated by Author

with the enhanced graphics adaptor. Black and white slide reproduction from Author graphics can include digitised images.

The package costs \$900 for one workstation. Microcraft's discount for educational institutions brings the price down to \$630.

*Microcraft
P.O. Box 63
Canterbury VIC 3126
(03) 817 3214.*

More mass storage subsystems

Tallgrass Technologies Australia has added two external units to its mass storage subsystems. These are the TG 1020e, a 20M tape backup system and the TG 2025e, a 25M fixed disk with a 20M tape backup system.

Both systems use the DC-2000 tape cartridge, and are small

enough to be portable.

They include BackTrack, Tallgrass' software-based automatic hard disk backup system, and XTREE, a menu-driven file and directory management program.

**Tallgrass TG 1020e \$2599
TG 2025e \$4499**

*Tallgrass Technologies Australia
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Five Dock NSW 2046
(02) 712 2010.*

Integrated voice/data terminal

This terminal connects to the Ericsson MD110 voice/data switch and gives high levels of simultaneous and independent voice and data communications through the MD110 telephone system. The key is the PC option board. This plugs into the free full board slot, allowing any MD100 digital system telephone to be connected to the option board to complete the voice/data workstation.

The option board interfaces with the MD110 via a pair of normal telephone wires. Standard software packages developed for PC communications using the Hayes smart modem keyboard dialling protocol will run directly in the terminal.

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Tallgrass TG-2025e: an external portable 25M hard disk with 20M tape drive

Emulex introduce subsystem kit

Emulex has introduced the ATS kit, a subsystem kit that provides the IBM PC/AT with high capacity disk storage and a cartridge streaming tape drive for backup. Emulex claim it is the first company to offer an embedded, high capacity, high performance total disk and tape package for the AT.

The ATS kit is aimed at the system integrator or value added retailer who purchases large quantities of ATs and adds application software or other features before shipping to the user.

The kit offers backup capacities of 112M, 146M or 319M (formatted) with its installation taking up just one slot and one DMA channel. Each ATS kit, regardless of size, includes a 5¼ inch ST506 or ESDI fixed disk drive with an Emulex MD01 or MD21 disk controller, a quarter inch streaming tape drive with an Emulex MT02 tape controller,

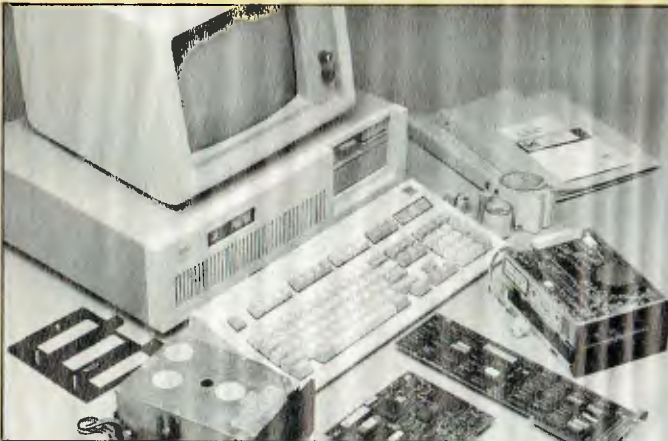
an Emulex IB02 host adaptor and cables, a mounting frame for the MD01 or MD21 disk controller and rails to install the disk and tape drive peripherals onto the AT.

The MD01 provides a 5M bit data access rate from the disk plus data integrity, while the controller manages multi-tasking operations and provides a high speed data buffer.

The MD21 features a 32K buffer, defect management and dynamic bad-block replacement.

The MT02 is in the chassis of the tape transport. It supports the industry standard QIC-36 interface and automatically performs a read/write verification on each block of data. The IB02 plugs into the AT I/O slot. It provides an external SCSI port.

*Emulex
Suite 106
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(02) 858 4833*



Emulex's ATS kit which provides the IBM PC/AT with high capacity disk storage and a cartridge streaming tape drive for back up

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Pick release 2.0 features a speed increase of about 24 per cent, support for streaming cartridge tape and three parallel printers, and a PICK DOS bridge.

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Dynamic package from Sonfat

Sonfat Computer and Information Systems has released TUTSIM, an interactive, user-friendly, powerful simulation package for dynamic systems or models. It has more than 70 pre-programmed function blocks including the integrator, differentiator, delay function, noise function, general function generator, limiter and relay.

The user connects a combination of these function blocks to describe the dynamics of the model (or system), similar to programming an analog computer but without having to deal with the problems of scaling and amplifier saturation. Model data can be entered via the keyboard or from a previously prepared data file and simulation results

and model data can be saved on disk files for use in later simulation runs.

The simulation results and graphical plots on the screen can be dumped onto a printer or plotter.

TUTSIM is available for the PC, AT, XT or compatibles. It can be configured to use a 8087 or 80287 co-processor to speed up the simulation. The package also supports Epson, C-Itoh, IBM and compatible printers, and HP 7475 or equivalent plotters via the RS232 serial port. There are professional and student versions of TUTSIM available.

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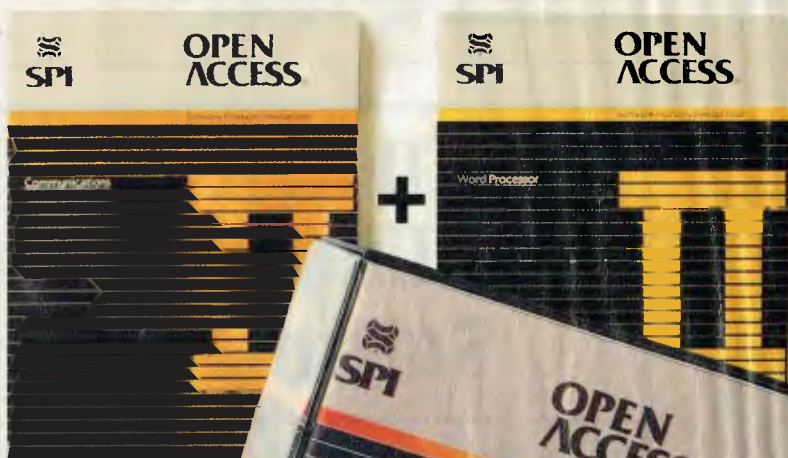
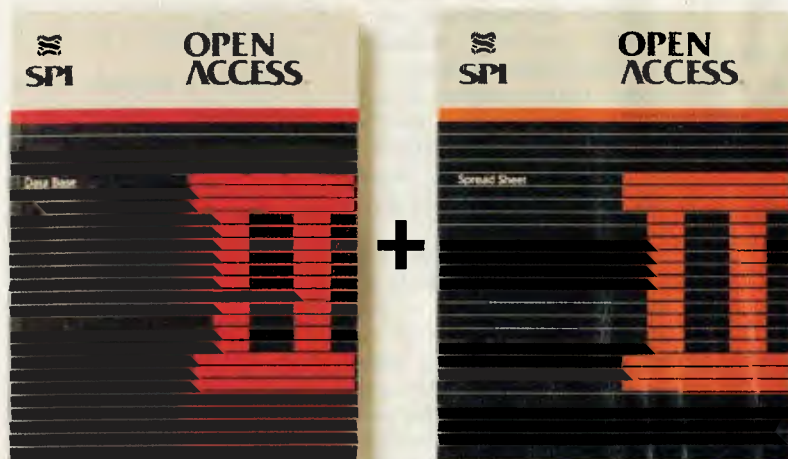
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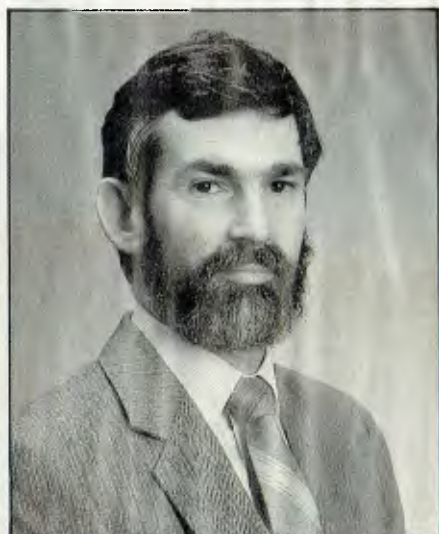
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Data inversion



If you have any hints, tips or patches which you would like to pass on send them to: Spreadsheet Clinic, PC Australia GPO Box 55A, Melbourne Vic 3001. Authors of published items will receive a complimentary box of diskettes.

Control codes in 1-2-3 Release 2

It is not necessary to generate the printer control characters for *Release 2* of *Lotus 1-2-3*, as they can be directly specified in the spreadsheet. A page break can be selected from the worksheet menu command. Other control codes can be inserted into the A column, preceded by two split vertical bar characters. The codes are defined in the same way as the initialisation string under the print command.

For example, to switch to compressed print with an Epson printer, type `!!\015` into the A column immediately before the first line where compressed print is required.

This is the good news. The bad news is that all the fancy codes described in the June issue of *Spreadsheet Clinic* are not useable in *Release 2*. They are simply discarded during a file import (*Symphony* does

the same thing). However, I'm sure that a reader will discover a solution to this.

Inverting data in columns

A way to invert data in a *Symphony* or *1-2-3*, Release 2, column without writing a macro is shown in figures 1 and 2. The entries in cells D9 and D19 will always appear in reverse order in cells E9 to E19. They may be labels or numbers. In this example I have used a series of random numbers in D, which are reversed in E. Every time you hit F9 (Calc) you will get a new series.

This inversion technique will work with a column of any length, as long as it lies between A and Z. Named ranges are as follows: Start = D6, Count = E6, Range 1 = the column of data to be inverted. The formula that does the real work is the one in E9, which is copied down to E19. The formulas in Count and Range could easily be included in the formula in E9, but I have broken them out here for clarity.

Charles Parkhurst

If you work out what the formula in E9 is doing, you will have a pretty good understanding of string

handling in Symphony and 1-2-3 Release 2. The @CELL("col", !D9) returns the column number which is converted into the correct ASCII code for the column letter by adding 64. This only works for a column with a single letter column designator. The @CODE converts this to the letter itself. The @STRING contains a very tricky expression which gives the row number for the cell desired. This must have taken some thought as it is hard enough to comprehend when it is given to you on a plate.

	D	E
3	Data Inversion Formula	
4		
5	Start	Count
6	9	11
7		
8	Range1	Inverse
9	9	3
10	4	4
11	9	1
12	3	0
13	1	1
14	6	6
15	1	1
16	0	3
17	1	9
18	4	4
19	3	9

Figure 2: The order of the data in column D is automatically reversed in column E.

	D	E
3	Data Inversion Formula	
4		
5	Start	Count
6	@CELL("row", RANGE1)	@COUNT(RANGE1)
7		
8	Range1	Inverse
9	@INT(10*@RAND)	4
10	@INT(10*@RAND)	6
11	@INT(10*@RAND)	4
12	@INT(10*@RAND)	7
13	@INT(10*@RAND)	7
14	@INT(10*@RAND)	3
15	@INT(10*@RAND)	3
16	@INT(10*@RAND)	7
17	@INT(10*@RAND)	7
18	@INT(10*@RAND)	2
19	@INT(10*@RAND)	2

Formula in cell E9:

`@@(@CHAR(@CELL("col", !D9)+64)&@STRING($COUNT+2*$START-@CELL("row", !D9)-1,0))`

Figure 1: The formulas for data inversion.

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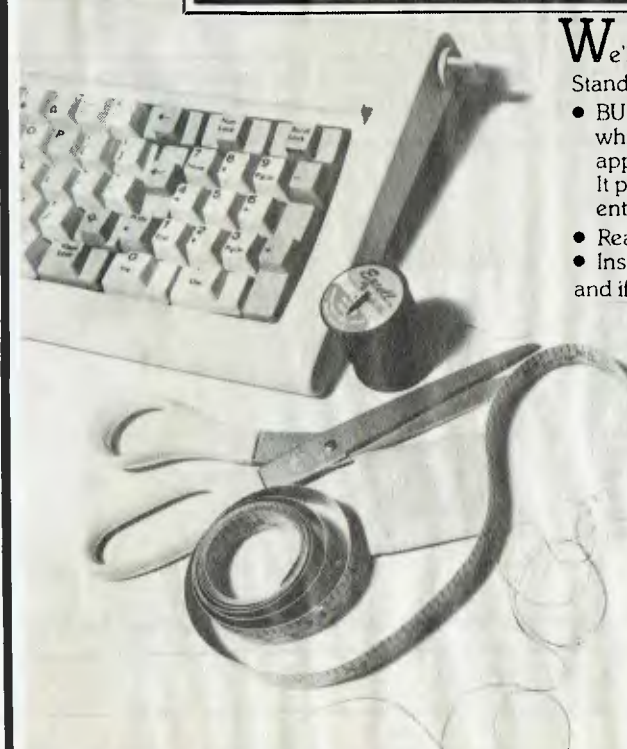
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More boots



If you have any hints, tips or patches which you would like to pass on send them to User-to-User, C/O PC Australia GPO Box 55A Melbourne Vic, 3001. Authors of published items will receive a complimentary box of diskettes.

This month we have some technical contributions on creating COM files to re-boot your machine. I hope such procedures involving DEBUG do not put some readers off. If you are going to attempt to use DEBUG, follow the prompts and enter the data exactly as shown.

Boot — one size fits all!

The June issue of your splendid publication contained a reboot program that would only work on an IBM PC. I have painstakingly developed my own version of this routine that will run in any DOS environment. To install this program simply use DEBUG as shown.

```
A>DEBUG
-N REBOOT.COM
-R CX
CX 0000
:30
```

```
-E 100 BA 0D 01 B4 09 CD 21 B4
-E 108 08 CD 21 EB FA 50 72 65
-E 110 73 73 20 5B 43 74 72 6C
-E 118 5D 5B 41 6C 74 5D 5B 44
-E 120 65 6C 5D 20 74 6F 20 63
-E 128 6F 6E 66 69 72 6D 24 00
-W
Writing 0030 bytes
-Q
A>REBOOT
```

Peter Russell
North Balgowlah, NSW

We often receive suggestions from readers who obviously have that special insight into DOS, the IBM PC and related products. This particular contribution highlights the mark of a true master — the ability to make the complex simple for all!

As I cannot test every possible machine, I strongly suggest that you put this file onto a freshly formatted diskette, change default drives to the diskette drive and then attempt to execute REBOOT.COM!

User-laziness

The other day I was printing out some documentation and program listings where I needed to manually press the form feed on the printer between each output. Feeling lazy, I thought I would put my mind to being able to instruct the printer to perform a form feed without leaving my keyboard. What I finally came up with was to enter at the DOS prompt; COPY CON: PRN:

Then hold down the Alt key and type 12 on the numeric keypad, release the Alt key, press the F6 key and then press enter.

Robert Anderson

This works by sending the ASCII code 12 (hex 0D), normally the form feed character, to the printer. By the way Robert, have you heard of the 'Life — be in it!' campaign?

Fleet-footed boots

June's User-to-User contained a re-boot program written with DEBUG. This program can be improved by setting the RESET_FLAG to 1234H before jumping to RESET routine in the ROM BIOS. This tells the BIOS that it is a warm boot and the memory parity check is not carried out. That is, this program stimulates pressing Ctrl-Alt-Del, which saves you about two minutes every time you use it. Two methods are shown in Listing 1.

Andrew Trevor-Jones
Glenbrook, NSW

Another improvement on the June warm boot submission. You could also refer to the December 1985 and June 1986 issues section for other variants.

```
A>DEBUG
-N WARMBOOT.COM
-R CX
CX 0000
:11
-E 100 B8 40 00 8E C0 26 C7 06 72
-E 109 00 34 12 EA 00 00 FF FF
-W
Writing 0011 bytes
-Q

A>DEBUG
-N WARMBOOT.COM
-R CX
CX 0000
:11
-A
????:0100 mov ax,40
????:0103 mov es,ax
????:0105 es:
????:0106 mov word ptr [0072],1234
????:010c jmp ffff:0000
????:0111^ C
```

```
-W
Writing 0011 bytes
-Q
```

Listing 1: Two methods of entering the warm boot program.

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Video function fix

Richard Norman explains a routine to protect all registers when making BIOS calls.

Calls to the ROM BIOS generally preserve all registers except those explicitly designated to return values, according to the IBM *Technical Reference Manual*. The video service call, INT 10H, is a notable exception: the BP register is altered any time the screen is scrolled. This can cause problems because the BP register is commonly used as a stack frame reference for subroutine linkage in high-level languages, and the video function call is an often-used service.

Programmers can avoid this problem when working in assembly language. However, programmers using compiled languages do not have control over the use of registers. Many ordinary programs are able to run successfully because the BP register is restored on return to the calling sequence. Problems are most likely to occur in a situation when direct BIOS calls are made from a high-level language, for example, when trying to scroll a window.

The source code described below which is intended to fix this problem, patches the BIOS call itself. If installed as part of the system boot, this code, called VIDFIX.ASM, will correct any high-level programs that may run with

occasional, unexplained crashes.

The source code must be assembled and linked before it can be installed. The resulting .EXE file can be converted to a .COM file using the DOS utility EXE2BIN. After the command VIDFIX is added to the AUTOEXEC.BAT file and the VIDFIX.COM file is included on the system disk, executing VIDFIX will install the program as a resident part of memory. This program substitutes for the original INT 10H call and adds the appropriate PUSH and POP. The installation code provides a test to ensure that the code is installed only once.

Apparently the problem of INT 10H was discovered after the BIOS was embedded in ROM — this is the only BIOS call for which the prologue to the source code mentions that some registers (DI, SI, and BP) are destroyed. However, the code itself clearly shows that the SI and DI registers are restored. Only the BP register is not preserved, and it was obviously an oversight not to include this register in the long list of PUSHes and POPs. ■

Richard Norman has a PhD, in communications sciences.

LISTING 1: VIDFIX.ASM

```
; VIDFIX.ASM          R. Norman          Nov. 11, 1985
; Fix BIOS Video Interrupt 10H to save BP register
; Install a resident program patch into the operating system.
;
; Script to assemble into COM file:
;   MASM VIDFIX;
;   LINK VIDFIX;
;   EXE2BIN VIDFIX.EXE VIDFIX.COM
;
; Make sure VIDFIX.COM is on boot disk and include the line
;   VIDFIX
; in AUTOEXEC.BAT
;

CSEG      SEGMENT
          ASSUME CS:CSEG

VIDFIX    PROC    FAR
          ORG     0100H
DRIG:     JMP     INSTALL      ;installation skips over resident code

          ;resident data area
OLD10     DD      ?           ;save area for original INT 10H vector
ID         DW      'RN'       ;id code to test for re-installation

EXEC:     ;beginning of executable resident code
          PUSH    BP
          PUSHF    ;simulate INT call
          CALL    CS:OLD10     ;old INT 10 executes STI and RETI
          POP     BP
          RET     2           ;clear old flags from stack
ENDEXEC:  ;end of executable resident code
```

```
HELLO$    DB      0DH,0AH,'Install INT 10H fix ',0DH,0AH
          DB      'R. Norman, Nov. 11, 1985',0DH,0AH,'$'
ALREADY$  DB      0DH,0AH,'INT 10H fix already installed. Request
          DB      ignored.'
          DB      0DH,0AH,'$'

INSTALL:  ;beginning of installation code
          ASSUME DS:CSEG
          MOV     DX,OFFSET HELLO$
          MOV     AH,9
          INT     21H          ;login
          MOV     AL,10H
          MOV     AH,35H
          INT     21H          ;get current INT 10H vector into ES:BX
          CMP     ES:[BX-2], 'RN' ;if test id is present
          JE      NOINST      ; it is already present
          MOV     WORD PTR OLD10,BX
          MOV     WORD PTR OLD10+2,ES ;save current vector
          MOV     DX,OFFSET EXEC ;note, DS already has segment of EXEC
          MOV     AL,10H
          MOV     AH,25H
          INT     21H          ;reset interrupt 10H to new code
          MOV     DX,OFFSET ENDEXEC ;length of resident code
          INT     27H          ;terminate and remain resident

NOINST:   ;here, exit without installation
          MOV     DX,OFFSET ALREADY$
          MOV     AH,9
          INT     21H          ;say it is already installed
          INT     20H          ; end terminate normally

VIDFIX    ENDP
CSEG      ENDS
END       ORIG
```


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A new frontier

Talkback radio turned radio programming on its head because it offered the audience a chance to have its say. Look at the conferencing under way on the Frontier Systems RBBS and you can see the same impact being made on the bulletin board audience.

Looking for a solution to a particular problem, or wanting to join a discussion about your particular computer interest at the moment? Then Frontier Systems RBBS deserves your attention. It is packed with a rich diversity of conferences under way in the message section. Join in and enjoy.

The sysop, John Stanton, says, "I believe that the power of the RBBS is dependent on the needs of the users who log onto my system. I leave it up to them to express any enhancements which I should make to the system, and to make it one of the best systems which is currently on line."

To encourage talkback, Stanton has also offered IBM PC and PC compatible user groups private conference facilities. This should be handy for user groups which do not have their own BBS. He has set up conferences in the message section dedicated to PC compatibles including Challenger, Olivetti, Texas Instruments, NEC APC, Compaq, Corona and Sanyo; IBM hardware and IBM software, 4 Sale, Pascal and Turbo Pascal, Lotus 1-2-3, Symphony and dBase I, II and III are all waiting for you to join in.

Stanton started this BBS in April 1985 because of problems he had logging onto other systems. "I found it very frustrating when downloading programs I thought would be interesting to discover they were for another type of computer and wouldn't run on my machine. Another reason was that it sometimes took me two to three weeks to get on to an appealing BBS," he says.

Between 10 and 15 users log on each day and some of them log on two or three times in a week. There are more than 30 registered users and another 200 people, who have not fully registered use the board at irregular intervals. Less than five per cent of them are women.

"From my experience with women who have a keen interest in computers, I'm very surprised there aren't more who log onto BBSs," says Stanton.

The majority of people logging on appear to be newcomers who want to learn more about computers. There are also a number who have problems with their hardware or software and they join the conferences to seek help from other users.

The Frontier Systems hardware is a Phoenix Model III with 640K of RAM, two serial ports, two parallel ports, a real time clock, a monochrome monitor (built by Stanton), two floppy drives, two 20Mb hard disk drives, a C Itoh 8510 graphics printer and a Data Sat V2123 modem which automatically detects the protocol and adjusts itself accordingly.

Stanton, who has worked in electronics for more than 10 years and has worked with computers since 1978, is a computer technician with a large computer company specialising in trouble shooting. To relax he drives cars or goes for a long walk with his collie dog.

Asked to predict the future direction of BBSs in Australia, Stanton sees a global village. "I think there will be a network of systems all sharing common messages and public domain software.

"You'll be able to leave a message on your local BBS for someone in another state, or even in another part of the world! Some day soon all BBSs will be linked together on one network."

Frontier System RBBS



Sysop: John Stanton

Phone: (02) 977 0323

Hours of operation: 24

Baud rates: 300 full duplex, 450 full duplex, 1200 full duplex.

Parameters: 8 Data Bits, 1 Stop Bit, No Parity. Users log on with 7 Data Bits, 1 or 2 Stop Bits, Even Parity.

Access: Open system. Visitors are permitted 30 minutes daily.

Registration: Only required if you want to download files, receive a regular BBS newsletter and open "Doors". Costs \$15 annually.

Cheques or money orders payable to Frontier Systems RBBS at P.O. Box 130 Manly, NSW, 2095.

Password: A personal password is notified to each registered user.

Time limit: 100 minutes a day.

Files for downloading: Almost 500, all for IBM PC and compatibles.

Software: RBBS-PC Version CPC12.5B program, written by Thomas Mack in the USA in compiled Basic. Allows multi-user facilities to be added. Choose from "novice" or "expert" mode.



Bulletin board

PC User Groups

MELB-PC

Contact: Lloyd Borrett (03) 529 2333
Time: 6.00pm first Wednesday
Venue: Clunies Ross House
191 Royal Parade
Melbourne

Sydney PC User Group

Contact: Catherine Rosenbrauer
(02) 29 7033
Time: 5.45pm third Monday
Venue: Esso Auditorium
35 Clarence Street
Sydney

Perth PC Micro Users Group

Contact: Peter Goodwin (09) 274 5911
Time: 5.30pm first Tuesday
Venue: Royal Kings Park Tennis Club
Kings Park Road, West Perth

Adelaide PC Users Group

Contact: John Roberts (08) 212 5020
Time: 7.45pm second Thursday
Venue: 195 Gilles Street

PC Users Group Inc. (ACT)

Contact: Chess Krawczyk
(062) 80 5954
Time: 8.00pm final Monday
Venue: Coombes Lecture Theatre
Australian National University

Brisbane 16-Bit Users Group (BRISBUG)

Contact: Roy Willie (07) 393 3388
Time: 2.00pm third Sunday
Venue: Toowong State High School
Bywong Street, Toowong

Viatel users

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HiSoft IBBS (03) 799 2001
The National (03) 819 5582
Down Under (03) 429 5819

New South Wales

PC Exchange (062) 58 1406
PC User Group 300 Baud (02) 238 9034
1200 Baud (02) 221 5520

Micro Design Lab (02) 663 0150
Sydney Public Access (02) 808 3536
Prophet RBBS (02) 628 7030
Dick Smith IBBS (02) 887 2276
(02) 625 8071

South Australia

Adelaide User Group (08) 271 2043

Queensland

Competron 52 9498

Western Australia

Perth PC Users BBS (09) 227 9229

APPLICATIONS USER

SOFTWARE GROUPS

Multiplan Users Group

Address: PO Box 95, Forestville, NSW 2087.
Contact: Richard Womack (02) 997 1554.
Meetings: 6.15 pm 2nd Wednesday,
City Personal Computing, 55 York St, Sydney.

dBase Users Group (includes Framework SIG)

Address: ACS, 72 Pitt St, Sydney 2000
Contact: Catherine Rosenbrauer (02) 74 1961
Meetings: 6.30pm 3rd Tuesday, ACS, 1st Floor,
72 Pitt St, Sydney

Spellbinder User Group

Contact: Kathie Hanson
Meetings: 6.00 pm fourth Monday, Room 9,
Trades Hall, Cnr Dixon and Goulburn Sts,
Haymarket, NSW 2000.

Forth Interest Group

Contact: Lance Collins (03) 29 2600, PO Box 103,
Camberwell 3124.
Meetings: 1st Friday, 8.00 pm, Bowen St Family
Centre, 102 Bowen St, South Camberwell.

Notice

If you have any further
PC community information for this
bulletin, contact Ian
Robinson (03) 602 4122 or
Margaret Macrae (02) 235 6617.

SPECIAL INTEREST GROUPS

The PC User Group in Sydney has spawned a
number of special interest groups (SIGs) which meet
at varying times throughout the month.

ComSIG — 5.45pm second Monday, ACS, 1st Floor,
72 Pitt St. Contact Geoff May (02) 699 3518.

BusinessSIG — 5.45pm fourth Tuesday, Peat
Marwick, 31st Floor Australia Square, Pitt St.
(02) 29 8685.

CHUSIG (Challenger PCs) — 5.45pm 2nd Tuesday,
4th Floor, 80 Arthur St, North Sydney. Contact
Geoff Townes.

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Turbo Pascal User Groups

Victoria

Address: PO Box 81
East Caulfield Vic. 3145
Contact: Ron Savage (03) 651 1414
Meetings: 7.00pm 3rd Monday St Mark's
Church, cnr Canterbury Rd/Burke Rd,
Camberwell

Western Australia

Address: 2/294 Rokeby Road,
Subiaco WA 6008
Contact: Frank Reynolds (09) 382 2692
Meetings: 7.30pm 2nd Tuesday
University of Western Australia Room G3
Electrical Engineering Building

Lotus User Groups

Melbourne

Contact: Robert Taylor (03) 267 4800
Time: 5.30pm first Tuesday
Venue: Light Car Club, 46 Queens Rd

Sydney

Contact: Ron Pollak (02) 290 3655
Time: 5.45pm first Thursday
Venue: National Australia Bank House,
12th Floor, 255 George St

Perth

Contact: Peter Foreman (09) 322 5589
Time: 5.30pm second Wednesday
Venue: KMC Hungerford, 9th Floor,
190 St George's Tce

Adelaide

Contact: Paul Wragg (08) 223 5711
Time: 7.30pm first Tuesday
Venue: 164 Fulerton Rd, Dulwich 5065

Brisbane

Contact: Bill Savage (07) 221 2144
Time: 5.30pm first Tuesday
Venue: MLC Centre, 28th Floor,
230 George St

Newcastle

Contact: Louis Lee (049) 26 8692
Time: 5.35pm first Thursday
Venue: Newcastle Gas Company, 623 Hunter St

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Netcomm SmartModem 2400	999
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An expanding audience

Tales of 300 per cent growth within certain sectors of the PC industry were commonplace (and in fact boringly frequent) two years ago, but are now quite rare events in an economic climate that just ain't what it used to be. It may be a surprise to many that there are still market sectors experiencing this type of expansion, but nevertheless it is true.

You may remember me mentioning in the videotex special issue of PC Australia (July 1986) that our Viatel-based bulletin board service for readers was opened to the general public during the Videotex 86 exhibition in Sydney on July 1. Well, since then the number of accesses to that service has skyrocketed, making it one of the fastest-growing news and information services currently on Viatel.

The frame access counts for the PC Australia bulletin board service in July were well over 12,000, a 300 per cent increase over the figures of previous months.

The database managers at the Viatel branch of Telecom have acknowledged the intense interest among subscribers for any information pertaining to PCs and have been very supportive of the PC Australia service. The PC news section of the bulletin board is updated every weekday and at least one item a day seems to make it to Viatel's headline option (menu item 9) on the main menu page. I am told that many of the PC community prefer to log into the service during the evening, so the PC Australia headlines normally pop up at night.

Each time an item is deemed newsworthy enough to star as a Viatel headline, a message is passed on from Viatel to the fortunate service provider, detailing the item selected and the length of time it stayed on the main menu page together with the total number of accesses to the item



A page from PC Australia on Viatel

during that time. Needless to say, our information-starved editor can be seen printing out these messages each morning and filing them away for analysis as to what kind of items attract the most interest. It is impossible to obtain this type of feedback about specific magazine pages for example.

Whether this admirably high access rate to our bulletin board will continue depends on the continuing quality of information and the frequency with which it is updated. It can prove to be quite a trap for new information providers on Viatel. Once a service is started its survival depends upon regular updating of information. If users return to the same page three or four times and find it unchanged, particularly if a frame charge is incurred, they are very unlikely to return and the information provider will have to work ten times harder to regain their patronage.

The majority of videotex users appreciate the benefits in this new media, although it seems that quite a few past and existing service providers have not quite caught up to them. Unlike the page of a newspaper, a

page on Viatel is dynamic; it can change and it is expected to change! Organisations which fill videotex frames with static information that is unlikely to be updated are almost certainly using the wrong media. Obviously there are certain exceptions to this rule, such as help frames for new users, but by and large videotex pages (particularly news pages) should provide an ever-changing environment, reflecting the ever-changing outside world they are reporting on.

So the onus is upon PC Australia to continue to provide timely and relevant PC news items for the bulletin board service, a task which should not prove too difficult, given the constantly evolving PC and compatibles market and our unequalled news-gathering resources.

I will continue scanning the PC News Headlines (page *600631*) every time I log into Viatel, and I suggest that keen PC users wishing to keep abreast of all the news worth reading (as it breaks) should do the same. Why not send me an electronic mail note on your thoughts? See you next month.

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4. Only persons taking out a 12 month subscription to *BRW* are eligible to enter the draw. The prize will be awarded to the person nominated on the subscription application.

5. Judges' decision is final and no correspondence will be entered into.

6. Closing date is last mail on Friday October 3.

7. The winner will be drawn on Monday October 6 at noon and advised by telegram and announced in the Friday October 10 issue of *BRW* and in the public notices of the *Australian* on Friday, October 10.

8 Residents of South Australia are not eligible to enter.

9. Alfa Romeo will supply the prize car in Sydney and Melbourne but transportation charges outside these cities shall be incurred by the winner.

10. Alfa Romeo reserves the right to supply any colour or equipment level according to supply availability at the time of delivery.

11. The promoter is Business Review Weekly Publications Pty Ltd, 392 Little Collins Street, Melbourne. Raffles and Bingo Board (Vic) Permit Number 86746 issued on July 17, 1986. ACT Permit Number TP86/491 issued under the Lotteries Ordinance 1964. Approved by the Northern Territory Racing & Gaming Committee.

Boeing versus Lotus



Look for a **flurry** of interest in 3-D spreadsheets over the next six months or so. It is probably the only interesting thing happening in the **moribund spreadsheet** business.

Three-dimensional spreadsheets are not new. There have been a few notable versions of the idea over the past few years (The most recent is Paperback Software's *VP Planner*). But the market has not shown much

interest yet, since many users are still trying to cope with the two-dimensional concept.

If you do not understand 3-D spreadsheets, think of a 2-D spreadsheet as a card containing data written in cells. In 3-D you have a stack of such cards. In a 3-D spreadsheet model, each imaginary card can access data from every other card. I think the best use is in a corporation for departmental budgeting. Each department would have a standard spreadsheet template for its budget. The division head could then load each department budget into a 3-D model and **analyze numbers like crazy**. Now, each department makes a budget, then the totals are re-entered into a divisional spreadsheet.

Anyway, expect renewed interest because of a product from Boeing Computer Services, in Seattle. Boeing developed, in-house, a **whiz-bang Lotus lookalike** spreadsheet that uses virtual-memory techniques and works in three dimensions. It is definitely a superset of the Lotus spreadsheet. I prefer it to *VP Planner*, which is also 3-D but not as comfortable to use; do not ask me why. The Boeing spreadsheet uses no overlays, so it is

big. Real big! It is 450K and obviously requires a hard disk. I used it effortlessly. It can make a spreadsheet that is 64M large, too! Talk about an auditor's **nightmare**.

I visited Boeing to get a gander at this thing. The product is tentatively called *BoeingCalc*, an ugly name. Insiders are trying to get it changed to **747 — the Power Spreadsheet**, since 747 connotes big, powerful, reliable, and fast. It is written in a Boeing version of Pascal.

While this thing is hot, the company is not. I found Boeing to be typical of old industrial companies. Spell it S-T-O-D-G-Y. When I visited the 747 plant, one of the largest buildings in the world, **I was shocked** to find cheap Woolworth-type oil paintings in the main lobby. There were a couple of **cheap couches** there too. Are these guys out of it or what? I am used to Silicon Valley elegance. Spell it C-H-R-O-M-E. My suggestion: spend a few bucks. Grow some taste.

So it remains to be seen whether Boeing can sell microcomputer software from an **old-fashioned** perspective in a modern world. If it can, then watch Lotus do it one better.



Coming up

The October issue of PC Australia marks our first birthday, and to commemorate this auspicious occasion we will be presenting an overview and index of our first twelve issues. PC Australia was intended from the outset as an authoritative reference and PC users' guide, rather than just a news publication, and an index (together with our PC Australia binders) will help us to further this aim.

All of our regular contributors will be there for this 'birthday party' issue, although ultimately it will be you — the PC Australia readers, who get the presents. If you want to find out more, you will have to wait until the October issue of PC Australia.



A question of timing



The Aranda aborigines of Western Australia divide their day into 24 loose and gentle intervals, such as the first streaks of light and the twittering of birds. For me, the day is one yawning chasm which I leap into at the first streaks of light and crawl out of at the last drop of midnight oil. Time is an intense vacuum I pour myself into as I rush around in circles.

Any minor annoyance — a knock at the door, the need to reboot — sends bamboo shoots up my fingernails. My teeth gnash and my eyes bulge if my concentration is interrupted by someone intruding into my hallowed work space. Delay is my Beelzebub.

Minor annoyances are like skin irritants compared to the cancer of disk waits. Every time the PC trudges out to disk to grab a file or gets lost in its own private reverie, I climb up the wall. I sit there and picture the PC talking to itself, "Now let's see, I have to save something to disk — where did I put that disk — oh yeh, here it is — now where should I put it on the disk . . ." I pitied myself as doomed forever to stare and wait while the PC

plodded along like an ox in sludge. That was before I made a fateful call to Compaq.

I called Compaq as part of my normal PC Australia duties to let me fondle the new Deskpro 286 and review it for our authoritative pages. When the machine arrived, I stuck it in a corner while I rattled around on my old PC finishing one chore and then another. Finally, I yanked it from the box and turned it on.

The machine disappeared. All that exists is the keyboard and screen. The moment a key is pressed there is instant feedback as everything happens without DELAY. Images zip on and off the screen and files are gulped down whole onto the 30M disk; the end of a file seems right next to the beginning.

We all know that a toothless old PC is no match for a young buck 286 machine; well, I knew it but I didn't really know it. The Compaq has stirred up feelings hidden in my computer unconscious. I can, for the first time, discern the possibility of a human-machine fusion that would make for absolute efficiency. From brain to screen.

The Compaq Deskpro 286 is a big back-breaking lug of a box, built for heavy toil. The keyboard is softer than an IBM but not sloshy, like certain Asian clones where it feels as though you are pressing on small pillows. The screen switches between tight monochrome text and graphics. Cables, boards, plugs, ports are all beautifully constructed with a watchmaker's precision. I want this machine!

So do you, no doubt. We all want every computer innovation that is new, powerful and fast. Usually, I just gawk and raise an eyebrow. This time I touched the sacred stone and it was thus revealed to me that a 286 Compaq can alter the way I spend the mass of working hours. But have I touched, instead, the Blarney Stone? Is a cumulative saving of bits of time

of significance to me? Could I struggle along with my aged grandma PC and bear her senile lapses? Have I, yet again, been sucked into a whirlpool of greed while ignoring the enormous expense? Is increased efficiency just a "type A" behaviour that will leave me dribbling away in a convalescent home?

Efficiency is not produced by the computer. It is a human creation. Some people are congenitally inefficient and are plodders who build one word onto the next or add one chore to another until finished. Others dart in and out from chore to frivolity and back again to finish in a flurry of energy. Somedays I plod and others I dart and I expect that is the case for most of us. The only difference between me (and maybe you) and the rest of the world is that I spend a good deal of the day in front of a terminal. Every business function — diary, phone numbers, communications — are all computer based. I even dial the phone by typing the number on the screen. My efficiency is thus inextricably bound with the computer's capability.

I repel all allegations that this connection between me and the computer is too intimate or unhealthy. Work colleagues say that being cloistered in our little offices with computer companionship makes us anti-social and eventual sociopaths. Non-computer people say that bigger and faster machines merely fuel a sick mechanisation that saps creativity and community sentiments.

As I sit and write this I can feel a satisfaction which springs from rapid completion of a finite task. By my measure increased speed smoothly slides me into related work and offers me a solid environment for my pursuits. I get up, hug my kids and drink a cup of tea. The computer does not suck me dry. Instead, it offers an opportunity to dispense with impediments that are fruitless annoyances. ■

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"...Sherman tank of hard disk drives."

-InfoWorld
July 22, 1985



HAVE A NICE INQUISITION, DEAR.

When Infoworld's contributing editor, Bernie Zilbergeld and the InfoWorld Review Board said they reviewed our ATplus20™ hard disk drive, we figured that they gave it the routine technical and performance diagnostics.

We didn't expect *destructive* testing. They went after our legendary resistance to head-crashes with a vengeance.

HOW TO HENCH.

Mr. Z and his henchpersons began by subjecting the drive to 3,500 stops and starts.

Having survived this, our ATplus20™ drive then had to face increasingly severe physical torture while performing a seemingly relentless series of track seeking operations.

THINGS THAT GO BUMP IN THE DAY.

Further henching resulted in their bumping the table that the ATplus20™ was running on.

Then they *dropped* one side of the table from a height of six inches.

Next, the entire table was lifted one foot above the floor and dropped.

After cutting power to the drive (thus interrupting the seek test) they bumped the table severely, to see if the ATplus20's unconditional and automatic park and lock feature really makes a difference.

Then, they threw the book at us. Actually, they dropped a rather heavy book *directly* on top of the drive itself.

GUESS WHAT?

You're absolutely right. CORE's ATplus20™ hard disk drive not only survived, but continued to perform as specified.

Each of the rather unnerving tests was repeated a number of times on the same drive, just to be extra sure.

Or mean.

THE LAWYER'S 2¢.

The tests were so nasty that they had to publish the following warning:

"We caution you not to perform any of these tests on your own equipment."

We have to agree.

These tests were done to determine the limits of the drive, and were intentionally extreme beyond the normal use environment.

SEAL OF APPROVAL.

We're delighted that InfoWorld tested, evaluated and *validated*, exactly what we have been saying all along: *Now you can build the enhanced PC-AT that IBM didn't.*



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